SONY®

VIDEOCORDER

BVH-2500

The side panels and handles shown in this photograph are optionally available.

OPERATION AND MAINTENANCE MANUAL

Volume1 1st Edition (Revised 5)

Serial No. 10001 and Higher

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Volume 2

B. SEMICONDUCTOR PIN ASSIGNMENTS

C. SCHEMATIC DIAGRAMS AND BOARD LAYOUT

Volume 3

D. REPLACEABLE PARTS AND OPTIONAL FIXTURE

E. CHANGED PARTS

SECTION 1
OPERATION

The BVH-2500 is a VTR for broadcast and office uses, designed based upon a 1-inch helical scanning VTR BVH-2000, which has established a high reputation as a SMPTE type "C" format VTR. In addition to all functions of the BVH-2000, the BVH-2500 is provided with a revolutionary new recording system developed by Sony, called the "Δt recording". With the Δt recording, still pictures can be recorded and played back for every frame or field, and a frame or field of the recorded still picture can be replaced with a new one. This new still picture recording system makes it possible to use VTRs for various new applications, such as the production of master tapes for video discs, production of animations, computer graphics, duplication of a considerable amount of slides to video tapes, very slow speed recordings, etc.

1-1. FEATURES

New Recording System

The BVH-2500 is provided with a revolutionary new recording system in addition to the conventional recording and editing functions.

STILL recording (by field or frame)
One field or frame of still picture can be recorded at a time in the still mode of the VTR, and a field or frame of the picture can be replaced with a new one.

STEP recording (by field or frame)
Each time the EDIT/REC button is pressed, the tape advances by one field or by one frame and a still picture is recorded on that portion of the tape.

SLOW recording (by field or frame)
Recordings can be made while the tape is running at very slow speeds of 1/60, 1/30, 2/30, 3/30 or 4/30 of the normal tape speed.

The above three recordings (named "Δt recording system") can be used in any combination with each other and in the normal insert mode editing. Tapes on which recordings are made with the Δt recording system can be played back on any 1-inch, type "C" format VTR.

Compact and Lightweight

The BVH-2500 features a compact, high-output switching power supply and DC motor which, together with the compact tape transport and electronics, have made a considerable decrease in weight possible.
High performance and reliability, plus compactness and light weight make it ideal for all broadcast applications, Electronic Field Production, etc.

Easy Tape Threading

The tape transport has been greatly simplified. A high-precision movable guide system (inclined entrance and exit guide, erase head, and movable audio head cover) allow easy tape threading.

Two-hour Recording and Playback

Two hours of recording and playback are possible by using a Sony V-16-126 tape (11.75-inch reel), giving a much wider range of applications.

Computer Servo System

All data are input to the CPU data bus for instant processing. Feedback data are sent to the four direct-drive, brushless DC motors, and the VTR function controls (e.g. drum, reel, and capstan servo control) are all optimized.
The BVH-2500 has high-speed access capability and very short servo lock time. Two-hour reels or spot reels also can be used without any change to the system condition.

High-speed Dynamic Tracking ® System

High-speed digital tracking control gives smooth, reliable DT operation.

Expanded DT Playback Range

Noiseless playback is possible from −1 to 3 times normal speed thanks to the new DT head. It is especially useful for special-effect playback and for searching for editing points.

Program Play

The DT function and microprocessor allow correct variable-speed playback up to ±20% normal speed in 0.1% steps, and the playback time can be increased or decreased.

Variable Memory

Playback speed can be preset in the DT variable-speed playback range (−1 to 3 times normal) and repeated playback determined by the memory is possible. This is specially effective when editing using special effects.

Complete Editing Function

In addition to improved automatic editing functions, many extra functions (described below) make the BVH-2500 even easier to use.

Simple connection (serial code system)
For editing with two VTRs, connection between the VTRs (BVH-2500, BVH-2000, BVU-800, and BVU-820) is possible using a single 9-pin interface cable.

The player can be controlled from the recorder control panel.

Easy-to-read dot matrix fluorescent indicator
Timer, IN and OUT points, tape speed, and error messages are displayed on the indicator.

20-key keyboard

Audio split editing

Independent spot erase button

Capstan override function (±15% increase or decrease in speed in 3% steps)

Reaction and preroll time setting functions

Front Panel Operation

All operational switches and controls are functionally arranged in the function and level control sections. All circuit boards, such as the time code board, have the main switches and controls mounted at the front for accessibility.

Five Remote Control Connectors

There are five remote control connectors: TBC, monitor select, and three function control connectors. These connectors make it possible to install the BVH-2500 in any place, such as O.B. vans and studio consoles.

Video and Audio Confidence Playback Monitor

The video system has a CONFI (confidence) head in addition to the normal PLAY head, and it can be used as a spare head in the PLAY mode. The audio system is also provided with a confidence head, and can monitor the recording status of the AUDIO-1/2/3 and CTL tracks.

High Picture and Sound Qualities

High-fidelity recording and playback can be obtained by the use of specially developed components, such as new video and audio heads and by improvements of the automatic equalization circuit.

High Reliability

The BVH-2500 has been designed for overall reliability. In addition, the high-reliability, high-precision components, such as Sony's high-output brushless DC motors and long-life LED indicators used in the function control block make the BVH-2500 one of the most reliable machines available.

Alarm Functions

Various "alarms" are provided, such as no-signal alarm, drum non-rotation alarm, power supply and motor drive circuit overheating alarms, tape slack alarm, and servo/system communication abnormal alarm.

Tape Protection Mechanism

A tension release mechanism is provided to protect the tape. The abnormal tension detector and the movable entrance and exit guides which open prior to tape end give maximum tape protection.

Installation

The BVH-2500 has been designed for the ease of operation in every aspect. Configuration can be easily changed according to individual needs.

1-2. SPECIFICATIONS

GENERAL

Power requirements	AC 100V to 120V ± 10% 50/60 Hz
Power consumption	550W max.
Operating temperature	5°C to 40°C (41°F to 104°F)
Humidity	10% to 90% (non-condensing)
Weight	73 kg (160 lb 150 oz)
Dimensions (including handles and feet) (w/h/d)	570 × 680 ×588 mm (22½ × 26⅞ × 23⅛ inches)
Recording format	SMPTE type C 1.5-head system 1 head for video track 1 head for sync track
Tracks	1 Video track, 1 Sync track, 2 Audio tracks, 1 Audio-3 track (time code or cue), 1 Control track
Tape speed	24.4 cm/sec.
Writing speed (relative speed)	25.59 m/sec.
Recording time	126 min. with 11.75-inch reel
Time base stability	Within 3 μsec. p-p
Servo lock time	Within 2 sec. (with frame capstan servo mode from standby mode)
Tape timer accuracy	±1 frame (with continuous control track)
Fast forward/rewind time (transfer time)	Within 110 sec. (with 1-hour tape)
Recommended tapes	Sony 1-inch high density tape or its equivalent
Reel size	NAB Standard (Max. 11.75-inch type)

VIDEO

Video bandwidth	Flat to 4.2 MHz: ±0.5 dB 4.5 MHz: −3 dB
S/N ratio	Better than 48 dB (unweighted), self recording Better than 47 dB (unweighted), interchanged base (peak-to-peak composite video to rms noise measured with a Rohde & Schwarz noise meter)
Differential gain	Less than 4% (with Sony TBC)
Differential phase	Less than 4° (with Sony TBC)
Transient response "K" factor (2T pulse)	Less than 1
Tilt (horizontal and vertical)	Less than 1%
Moire	Less than −40 dB (75% color bars)
Chrominance/luminance delay	Less than 20 nsec.
Low frequency linearity	Less than 2%

AUDIO

Audio frequency response	CH-1, CH-2 and CH-3: 50 Hz to 15 kHz $^{+1.5}_{-3.0}$ dB 200 Hz to 7.5 kHz ±1.0 dB
S/N ratio	CH-1 and CH-2: Better than 56 dB (from 3% distortion level) CH-3: Better than 50 dB (from 3% distortion level)
Distortion (at 1 kHz)	CH-1, CH-2 and CH-3: Less than 1% (at operating level)
Wow and flutter	Less than 0.1% rms (0.5 Hz to 200 Hz, NAB unweighted)
Crosstalk (at 1 kHz)	Between any two channels Less than −60 dB

INPUT SIGNAL

Video input	1.0 ± 0.3 Vp-p (75 ohms)
External reference input	1.0 ± 0.3 Vp-p (75 ohms), Video
CF pulse input	TTL level, 15 Hz
Audio line input	CH-1, CH-2 and CH-3: +20 dBm to −30 dBm (600 ohms/10 kohms, balanced)
Audio-3 microphone input	CH-3: −60 dBs (high impedance, unbalanced)
Time code input	CH-3: 0.5 Vp-p (75 ohms), for SMPTE time code

OUTPUT SIGNAL

Video-1/2/3 output	1.0 Vp-p (75 ohms)
Waveform monitor output	Selected video/CTL/RF envelope/Spare (selectable)
Video monitor output	Input video/Demodulator output/TBC output/Spare (selectable)
Frame pulse output	TTL level. Color frame/Frame (selectable)
Reference video output	1 Vp-p nominal (75 ohms), for external TBC
DO signal output	TTL level/RF output (selectable) (can be converted to 150 ohms)
Time code output	CH-3: 0.5 Vp-p (75 ohms), for SMPTE time code
Headphone output	8 ohms, unbalanced, variable level control
Monitor output (L/R CH)	8 dBm (600 ohms, balanced), variable level control
Audio monitor select	CH-1/CH-2/CH-1 and CH-2/CH-3 (selectable)

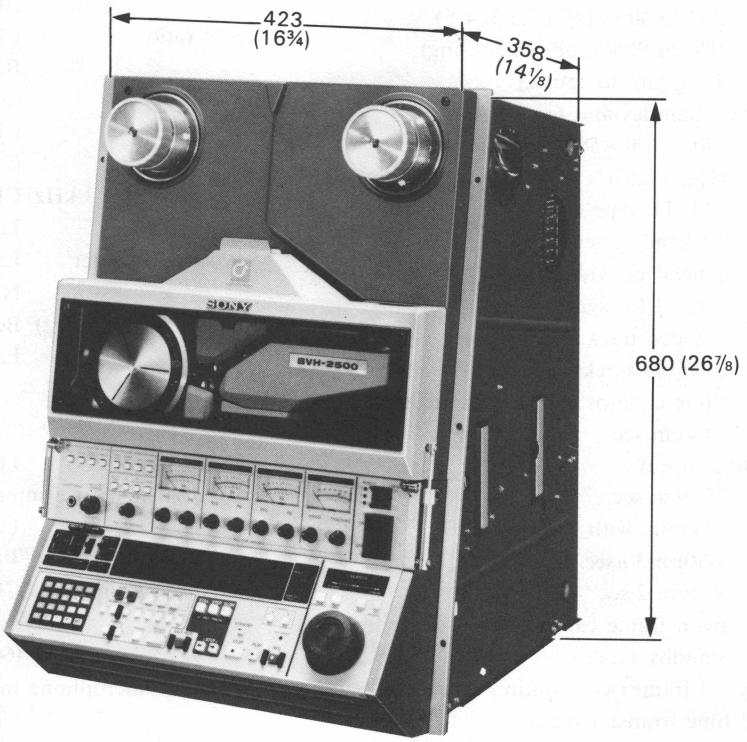
OTHERS

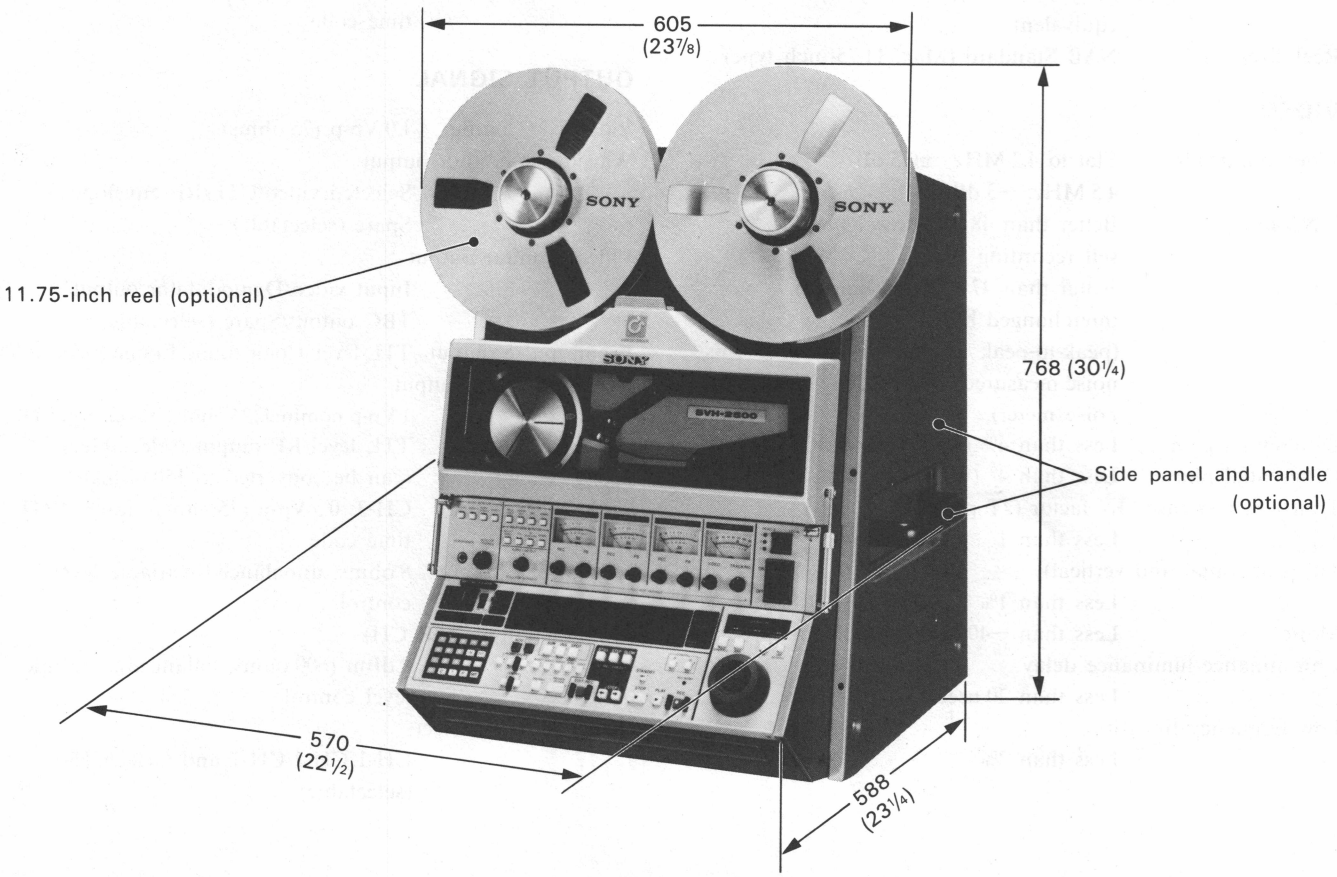
TBC output	To TBC (Sony BVT-2000) for Dynamic Tracking	Remote I/O-3	For parallel communication
Remote I/O-1	For CCJ converter	Auxiliary	For plug-in TBC remote control
Remote I/O-2	For 9-pin interface	Monitor select	For monitor select remote control

DIMENSIONS

Unit : mm (inch)

Main unit



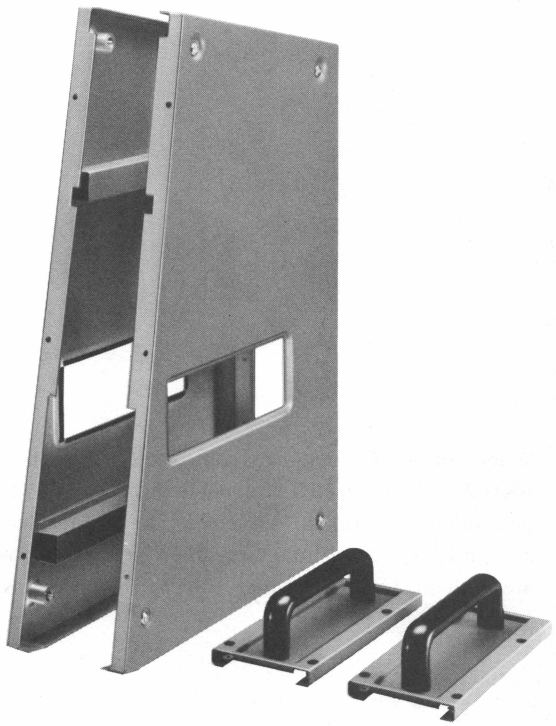


1-3. OPTIONAL PARTS AND ACCESSORIES

BKH-2501 function control panel

This panel is the same as the function control panel of the BVH-2500. When this panel is installed into an optional BKH-2017A remote control panel adaptor box, the BVH-2500 can be controlled from a distance.

BKH-2014 side panel kit



The side panels and handles are used when the BVH-2500 is used as a stand-alone machine.

BKH-2016 CCJ converter

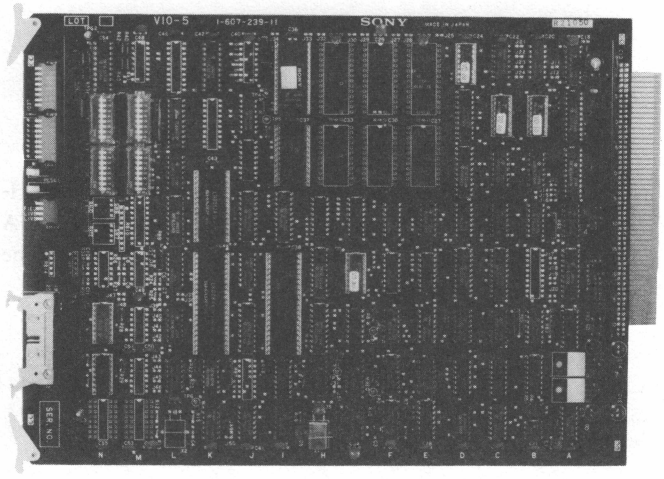
This is a converter to interface the BVH-2500 to conventional VTRs or editing control units with a CCJ type (10-pin) REMOTE connector. It is attached to the rear panel of the BVH-2500 for use.

Equipment to be connected:

Editing control unit: BVE-500, BVE-1000, BVE-5000, etc.
VTR: BVH-1000, BVH-1100, BVH-1100A, BVH-1180, etc.
Others: BVR-1000, BVR-1100, DTR-1100, IF-1000*, etc.

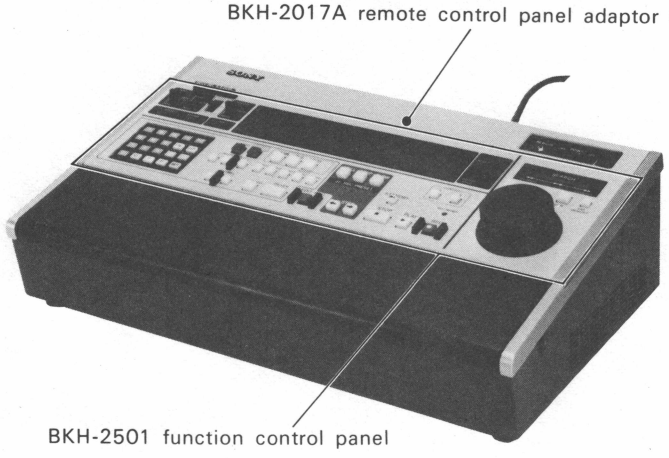
* When the IF-1000 is used, the PU-2016 power unit (optional) is necessary.

BK-5005 BVE-5000 interface board



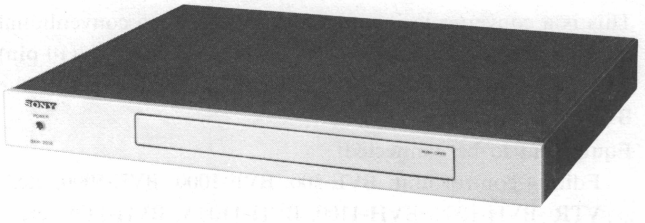
This is an interface board for interfacing the BVH-2500 to the BVE-5000 automatic editing control unit. It is installed in the BVE-5000. Two D-SUB 9-pin connectors are provided with the board. (If this board is installed in the BVE-5000, the BKH-2016 CCJ converter is unnecessary.)

BKH-2017A remote control panel adaptor box



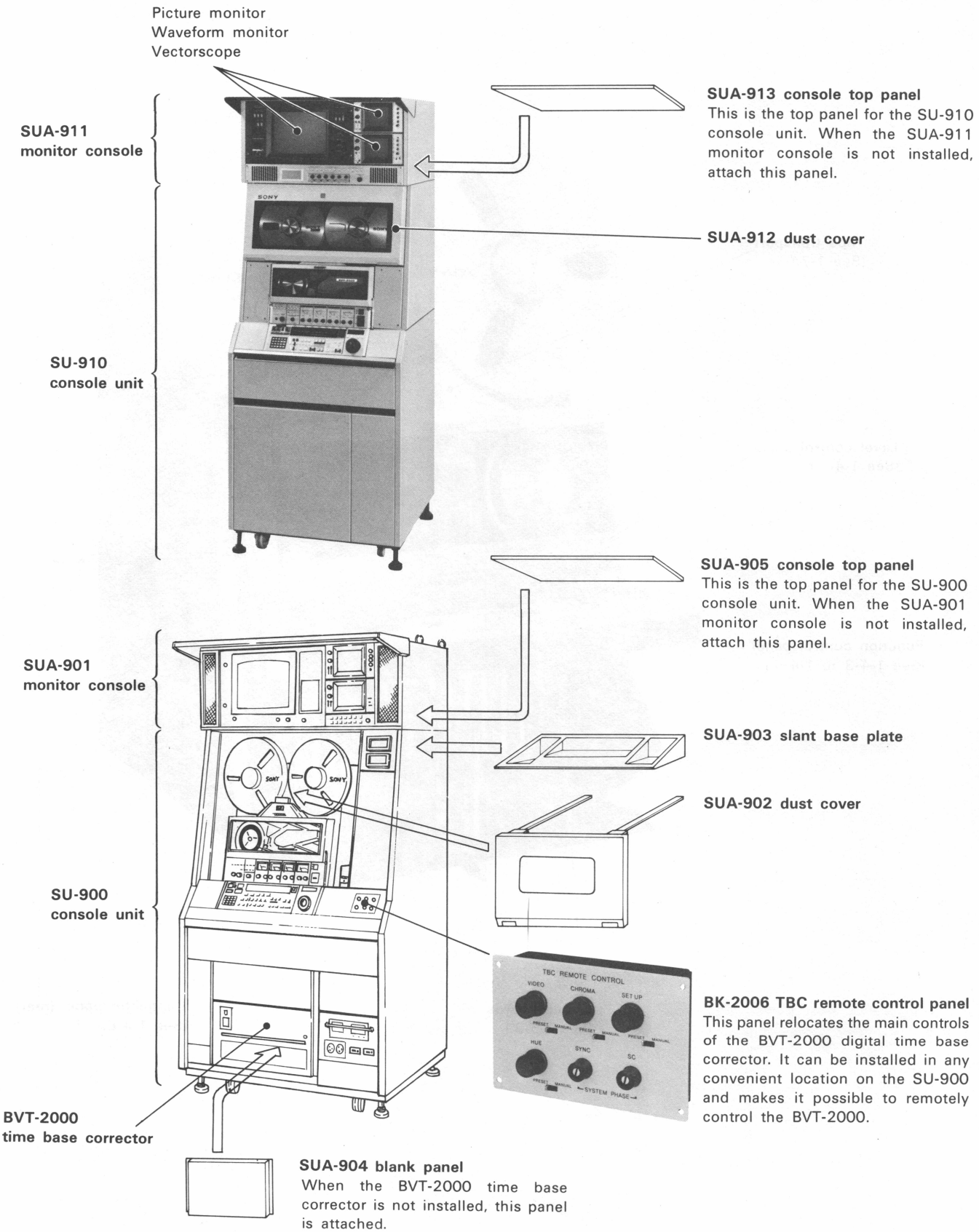
When you wish to remotely control the BVH-2500, install the BKH-2501 function control panel in this box. The VTR can then be remotely controlled. The box is angled for easy operation, and an RS-422 serial communication circuit and power supply are built in. Up to 1000 meters of extension is possible.

BKH-2018 9pin-CCJ converter



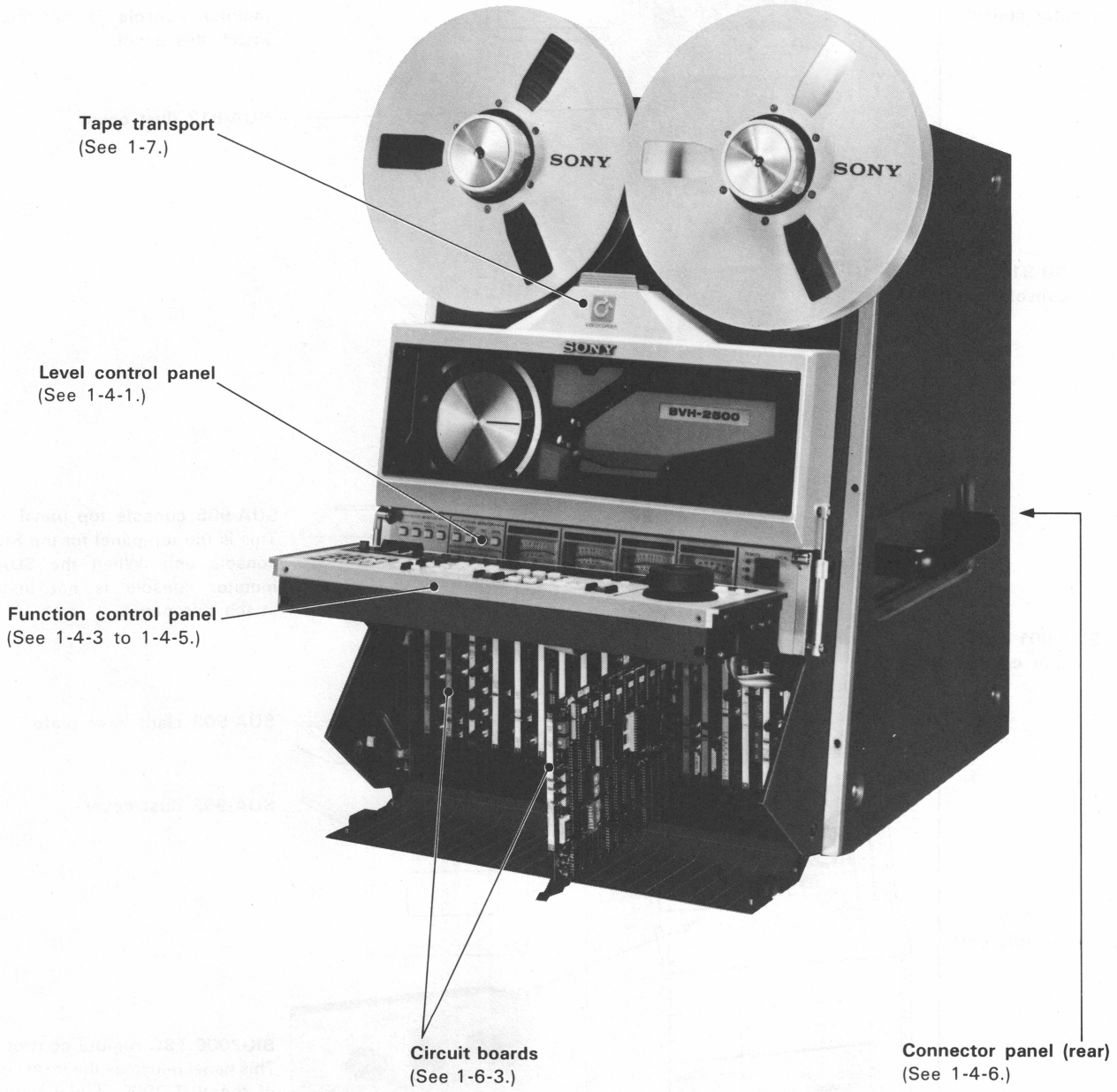
This converter is employed when the BVH-1000/1000A/1100/1180 is controlled by the BVH-2500.

Optional racks

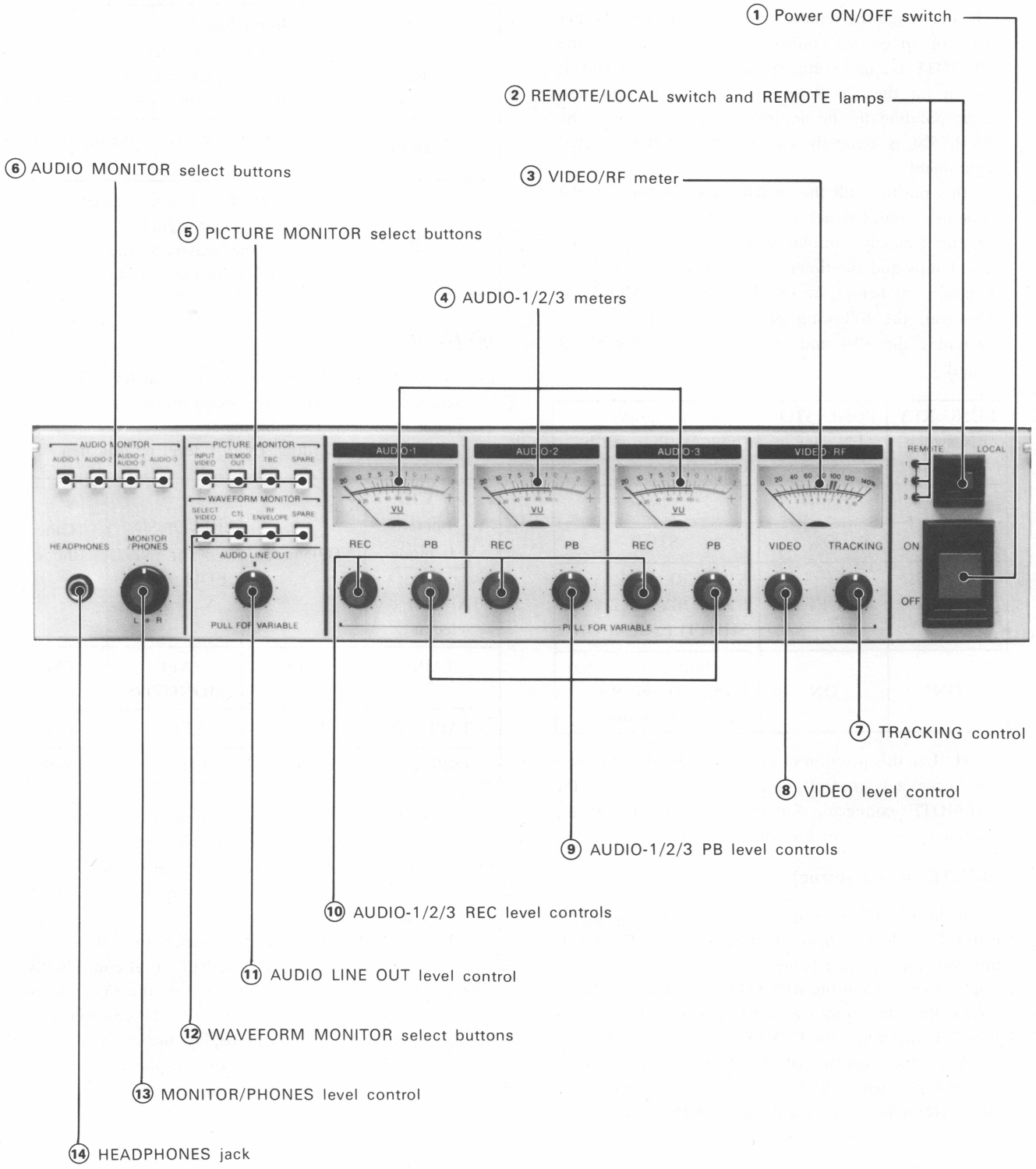


Ask your Sony personnel for details of the optional units.

1-4. LOCATION AND FUNCTION OF PARTS



1-4-1. Level Control Panel



① Power ON/OFF switch

When this switch is turned on, the display on the function control panel lights up and "INITIAL" is displayed. The VTR is set automatically to the STOP mode after 2 seconds.

② REMOTE/LOCAL switch and REMOTE lamps

REMOTE: When the remote control signal from another VTR or an editing control unit is connected to the REMOTE 1, 2 or 3 connector and when the REMOTE switch on the SY-79 board is set to the position corresponding to the control signal connection, the BVH-2500 is remotely controlled with the external equipment.
In this position, all the switches and buttons on the function control panel are made inoperative because they are remotely controlled with the external equipment. The lamps and the timer display remain in the same condition as before the switch is set to REMOTE.
However, the following operations are possible by switching the S9-4 and S9-5 switches on the SY-79 board:

FUNC KEY EN switch (S9-4)	FUNC STOP EN switch (S9-5)	Operating modes (buttons) that can be controlled at a distance
OFF	OFF	None
OFF	ON	STOP
ON	OFF	STOP, REC, PLAY, STANDBY, JOG, VAR, SHUTTLE, SEARCH
ON	ON	Any buttons other than P (player) and R (recorder) buttons

LOCAL: Use this position to operate the BVH-2500 alone or to remotely control another VTR connected to the REMOTE connector for using the BVH-2500 for parallel operation or for editing.

REMOTE lamps (three)

One of the REMOTE lamps (1, 2 or 3) lights up in the REMOTE mode to indicate the number of the REMOTE connector (on the rear) being used.
Lamp 1: Lights when the REMOTE-1 connector is being used. (Remote control via the BKH-2016 CCJ converter)
Lamp 2: Lights when the REMOTE-2 connector is being used. (Remote control via the RS-422 serial code)
Lamp 3: Lights when the REMOTE-3 connector is being used. (Remote control via the parallel IN/OUT signals)

③ VIDEO/RF meter

This meter indicates the video signal level. The following display is selected with the METER switch on the MD-22 board.

Position of the METER switch	Meter display
RF (V)	In the E-to-E mode, the level of the input video signal. During playback, the level of the RF signal from the video head.
INPUT	Always the level of the input video signal.
RF (S)	In the E-to-E mode, the level of the input video signal. During playback, the RF signal level from the sync head.

④ AUDIO-1/2/3 meters

These meters indicate the audio signal level. The signal selected by the TAPE/EE selector on the function control panel is indicated on the meter.
• During Δt recording, INPUT level is indicated.

VTR operation mode / Position of TAPE/EE selector	STOP mode	REC mode or EDIT mode	Other modes
TAPE	TAPE	TAPE (MONITOR)	TAPE
TAPE/EE	EE*1	EE	TAPE
INPUT*2	INPUT	INPUT	INPUT

*1 Only the AUDIO-3 meter indicates the TAPE level. The AUDIO-3 meter displays the E-to-E signal level when the TAPE/EE selector is set to INPUT. When the operation mode of the VTR is changed, this meter indicates the TAPE level.

*2
- At the INPUT position, meters indicate the signal level controlled by the REC level controls ⑩.
- When the EE switch (S9-3) on the SY-80 board is set to ON, the VTR is set to the enforced E-to-E mode and the meter displays the level of the E-to-E signal even in the INPUT position.

⑤ PICTURE MONITOR select buttons

These are used to select the signals fed to the VIDEO MONITOR OUTPUT connector on the rear panel.

INPUT VIDEO: For the video signal connected to the VIDEO INPUT connector.

DEMOD OUT: For the video signal output from the demodulator.

TBC: For the video signal connected to the TBC MONITOR INPUT connector.

SPARE: For the signal connected to the SPARE MONITOR INPUT connector.

- When the TAPE/EE selector is set to INPUT, INPUT VIDEO is automatically selected. When the selector is set to a position other than INPUT, the signal previously selected is output.
- During Δt recording, INPUT VIDEO is automatically selected.

⑥ AUDIO MONITOR select buttons

These buttons are used to select the signals fed to the HEADPHONES jack and the MONITOR OUTPUT connectors, as shown in the following table.

Select button \ Audio channel	L	R
AUDIO-1	AUDIO-1	AUDIO-1
AUDIO-2	AUDIO-2	AUDIO-2
AUDIO-1 AUDIO-2	AUDIO-1	AUDIO-2
AUDIO-3	AUDIO-3	AUDIO-3

Stereo output is obtained with the $\frac{\text{AUDIO-1}}{\text{AUDIO-2}}$ button.

⑦ TRACKING control

PULL: Compensates for tracking error during playback. Turn this control for the maximum indication on the VIDEO/RF meter.

PUSH: This is the preset position.

⑧ VIDEO level control

PULL: Adjusts the video recording level. Adjust this control so that the meter pointer comes within the blue zone on the VIDEO/RF meter.

PUSH: This is the preset position. (Refer to 1-6-2 for presetting.)

⑨ AUDIO-1/2/3 PB (playback) level controls

PULL: The audio playback level can be adjusted. During playback, adjust these controls so that the meter pointers of the AUDIO-1/2/3 meters indicate 0 VU at the peak.

PUSH: This is the preset position. (Refer to 1-6-2 for presetting.)

⑩ AUDIO-1/2/3 REC (record) level controls

PULL: The audio recording level can be adjusted for recording and editing. Adjust these controls so that the meter pointers of the AUDIO-1/2/3 meters indicate 0 VU at the peak.

PUSH: This is the preset position. (Refer to 1-6-2 for presetting.)

- The AUDIO-3 meter can be used to indicate the MIC input level from the MIC INPUT connector on the rear panel. The LINE input and MIC input are selected by the A-3 SEL switch on the AE-03 board (refer to 1-6-3).
- When the A-3 SEL switch is set to TC mode and the time code input selector to INT or EXT-1, the AUDIO-3 REC level control is inoperative.

⑪ AUDIO LINE OUT level control

PULL: This controls the audio playback level of audio channels 1 and 2 simultaneously. These are output from the AUDIO-1/2 LINE OUTPUT connectors. The adjustable range is ±6 dB of the level which has been adjusted by the AUDIO-1/2 PB level controls.

PUSH: In this position, the control is inoperative.

⑫ WAVEFORM MONITOR select buttons

These are used to select the output signal fed to the WFM MONITOR OUTPUT connector on the rear panel.

SELECT VIDEO: For the output signal selected by the PICTURE MONITOR select buttons ⑤.

CTL: For the playback CTL signal of the recorded tape.

RF ENVELOPE: For the RF envelope signal of the FM carrier played back by the video head.

SPARE: Not connected.

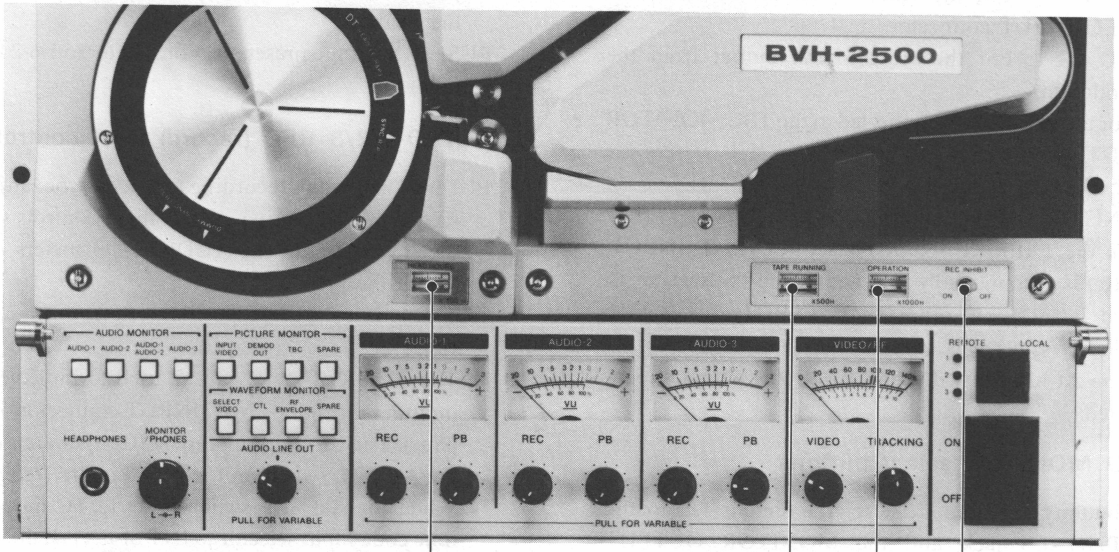
⑬ MONITOR/PHONES level control

This is used to control the listening level of the headphones or the output level of the AUDIO MONITOR OUTPUT connectors on the rear panel. When headphones are connected, the audio signal is not output to the AUDIO MONITOR OUTPUT connectors. (The headphones have priority.)

⑭ HEADPHONES jack

This jack is used to connect 8-ohm headphones. The audio output signals selected by the AUDIO MONITOR select buttons ⑥ can be monitored through the headphones. When the headphones are disconnected, the audio signals are supplied to the AUDIO MONITOR OUTPUT connectors. (The headphones have priority.)

1-4-2. Level Control Panel Peripherals



① HEAD HOURS meter

② TAPE RUNNING meter

③ OPERATION meter

④ REC INHIBIT switch

① HEAD HOURS meter

This records the time elapsed up to 1,000 hours. It starts operating when the drum rotates with the tape loaded.

② TAPE RUNNING meter

This records the time elapsed up to 5,000 hours. It records the tape running time in the tape running modes except STOP.

③ OPERATION meter

This records the time elapsed up to 10,000 hours. It starts operating when the POWER switch is turned on and it records the time for which the VTR is used.

④ REC (record) INHIBIT switch

This is used to inhibit the REC and EDIT REC modes.

ON: The VTR will not go into the REC mode even if the REC or EDIT/REC button on the control panel is pressed. Even when the VTR is remotely controlled, the record command is not accepted.

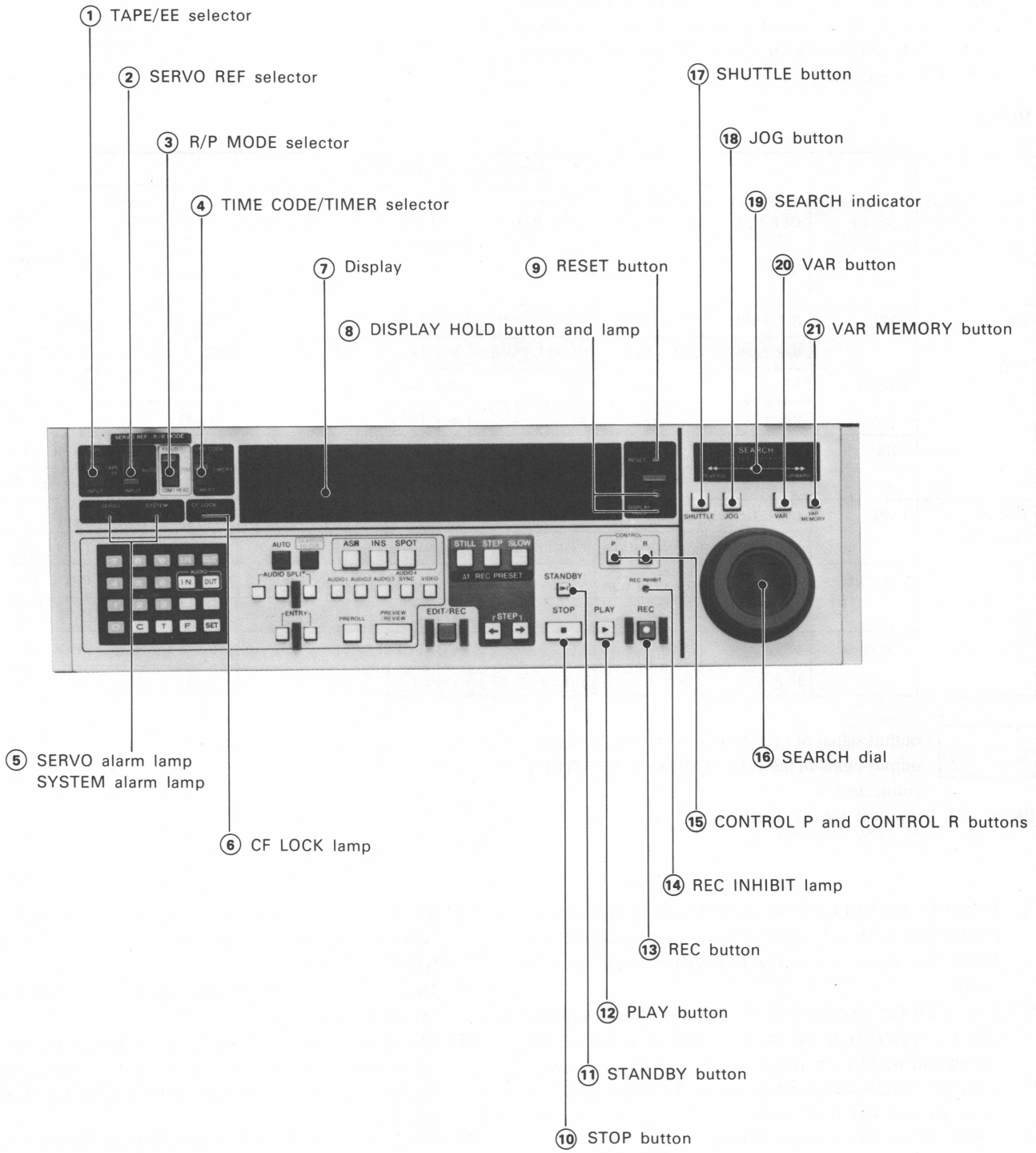
OFF: The REC and EDIT/REC buttons can be used normally.

Note: In accordance with the setting of the switches on the front panel and LG-04 board, the REC INHIBIT state is as shown in the table below.

REC INHIBIT switch		REC INHIBIT state
Front panel	LG-04 board	
ON	ON	ON
ON	OFF	ON
OFF	ON	ON
OFF	OFF	OFF

When the REC INHIBIT switch on the front panel is to be used primarily, set the switch on the LG-04 board to OFF, or remove it.

1-4-3. Function Control Panel — for Normal Recording and Playback



① TAPE/EE selector

Selects the output signal from the VIDEO OUTPUT, AUDIO OUTPUT and MONITOR OUTPUT connectors. The output signal is selected by the position of this switch and the R/P MODE selector ③ and the operation mode of the VTR as follows.

Video

Position of the R/P MODE selector ③	Position of the TAPE/EE selector ①	Operation mode of the VTR						
		STANDBY OFF *5, *7	STANDBY ON *5, *7	REC and EDIT REC	PLAY *5 and other modes	Between the IN and OUT points of the recorder in the PRE-VIEW mode *2	Δt REC	
							STILL REC STEP REC	SLOW REC
FIELD or FRM	TAPE	R/P TAPE	R/P TAPE	CONFI TAPE *1	R/P TAPE	EE	PROC EE	CONFI TAPE *8
		R/P TAPE	R/P TAPE	CONFI TAPE *1	R/P TAPE	EE	INPUT	INPUT
	TAPE/EE	EE	EE *4 (R/P TAPE)	EE	R/P TAPE	EE	PROC EE	PROC EE
		EE	EE *4 (R/P TAPE)	EE	R/P TAPE	EE	INPUT	INPUT
	INPUT *3	EE	EE *4 (R/P TAPE)	EE	R/P TAPE	EE	PROC EE	PROC EE
		INPUT	INPUT	INPUT	INPUT	INPUT	INPUT	INPUT
CONFI HEAD *6	TAPE	CONFI TAPE	CONFI TAPE	CONFI TAPE *1	CONFI TAPE	EE	CONFI TAPE *8	CONFI TAPE *8
		CONFI TAPE	CONFI TAPE	CONFI TAPE *1	CONFI TAPE	EE	INPUT	INPUT
	TAPE/EE	EE	EE *4 (CONFI TAPE)	EE	CONFI TAPE	EE	CONFI TAPE *8	PROC EE
		EE	EE *4 (CONFI TAPE)	EE	CONFI TAPE	EE	INPUT	INPUT
	INPUT *3	EE	EE *4 (CONFI TAPE)	EE	CONFI TAPE	EE	PROC EE	PROC EE
		INPUT	INPUT	INPUT	INPUT	INPUT	INPUT	INPUT

: output signal of the VIDEO OUTPUT connectors
: output signal of the VIDEO MONITOR OUTPUT connectors

PROC EE: Processed E-to-E mode

*1 If the REC CONFI OFF switch (S9-1) on the SY-80 board is set to ON, the E-to-E signal will be output in the REC or EDIT REC mode even if the TAPE/EE selector is set to TAPE.

*2 If the BVB ON switch (S8-5) on the SY-80 board and the CHAR switch (S7) on the TC-14 board are set to ON, the output will be black between the IN and OUT points.

*3 If the EE MODE switch (S9-3) on the SY-80 board is set to ON, the E-to-E signal will be output in all modes even if the TAPE/EE selector is set to INPUT.

Note: If either the VIDEO or SYNC channel is in the EDIT REC mode, refer to the REC/EDIT REC column in the table, even if the other channel is in the playback mode.

*4 If the REC INHIBIT switch is set to ON, the TAPE signal will be output.

Note: The time base of the E-to-E signal in the PROC EE (processed E-to-E) mode is different from that of the normal E-to-E mode signal.

*5 The locking phase of the drum changes in the INSERT and ASSEMBLE modes and during Δt presetting (STILL, STEP or SLOW).

*6 Do not set the R/P MODE selector to CONFI HEAD except in an emergency.

*7 The phase of the E-to-E mode signal during Δt presetting (presetting of STILL, STEP or SLOW recording) is delayed, compared with that of the normal E-to-E mode signal.

*8 If the REC CONFI OFF switch (S9-1) on the SY-80 board is set to ON, the PROC EE signal is obtained.

Audio

AUDIO channel	Position of the TAPE/ EE selector ①	Operation mode of the VTR				
		STANDBY OFF *4	STANDBY ON *4	REC and EDIT REC	PLAY and other modes	Between the IN and OUT points of the recorder in the PREVIEW mode *2
A1, A2	TAPE	TAPE	TAPE	EE	TAPE *1	EE
		TAPE	TAPE	CONFI	TAPE *1	EE
	TAPE/EE	EE	EE (TAPE) *5	EE	TAPE *1	EE
		EE	EE (TAPE) *5	EE	TAPE *1	EE
	INPUT *3	EE	EE (TAPE) *5	EE	TAPE *1	EE
		INPUT	INPUT	INPUT	INPUT	INPUT
A3	TAPE	TAPE	TAPE	EE	TAPE	EE
		TAPE	TAPE	CONFI	TAPE	EE
	TAPE/EE	TAPE	TAPE	EE	TAPE	EE
		TAPE	TAPE	EE	TAPE	EE
	INPUT	EE	EE	EE	TAPE	EE
		INPUT	INPUT	INPUT	INPUT	INPUT

: output signal of the AUDIO LINE OUTPUT connectors
: output signal of the AUDIO MONITOR OUTPUT connectors

*1 If the playback speed is 5 times normal or more, the output will be attenuated.

*2 If the BVB ON switch (S8-5) on the SY-80 board is set to ON, the output will be muted between the IN and OUT points.

*3 If the EE MODE switch (S9-3) on the SY-80 board is set to ON, the E-to-E signal will be output in all modes when the INPUT position is selected.

*4 When the INPUT position is selected in the STOP mode, the E-to-E signal of the audio channel 3 will be latched, and the E-to-E signal will be output from the AUDIO LINE OUTPUT and AUDIO MONITOR OUTPUT connectors even if the TAPE or TAPE/EE position is selected afterwards. When the VTR enters another mode, the latch will be released.

*5 If the REC INHIBIT switch is set to ON, the TAPE signal will be output.

- During Δt recording, the INPUT signal is supplied from the AUDIO MONITOR OUTPUT connector.

② SERVO REF (reference) selector

Selects the reference signal for servo lock.

EXT: The signal connected to the REF VIDEO INPUT connector ③ on the video connector panel (composite video signal) is used as the reference signal.

AUTO: In the REC, EDIT REC or EDIT preset mode, the input video signal is used as the reference signal. In the PLAY mode, the external reference signal is used as the reference signal (selected automatically).

INPUT: The signal connected to the VIDEO INPUT connector on the video connector panel is used as the reference signal.

- The amount of the sync signal to be advanced for playback can be changed by the ADV switch on the CD-17 board (refer to 1-6-3).

③ R/P MODE selector

Selects the unit of recording in terms of a field or a frame to be made one step at a time in the Δt recording mode (STILL recording, STEP recording or SLOW recording) and the unit of movement of the tape which occurs each time the STEP button is pressed.

Position of the R/P MODE selector	Unit of movement of tape and unit of Δt recording
FIELD	Field
FRM	Frame
CONFI HEAD	Field

This switch also selects the unit of DT playback when the S2 switch on the DT-04 board is set to REM.

- **Never switch the R/P MODE selector from FIELD to FRM or from FRM to FIELD while the Δt recording is being made.**
- Normal recording and playback are not affected by the setting (FIELD or FRM) of the R/P MODE selector.
- **Do not set the R/P MODE selector to CONFI HEAD in the normal operation.** (The "CONFI HEAD" position is to be used only for playback when the R/P head does not operate normally.)

④ TIME CODE/TIMER selector

This switch selects one of the following three kinds of tape running time to be displayed on the display ⑦.

TIME CODE: This is used to indicate the SMPTE time code. The A-3 SEL switch on the AE-03 board (refer to 1-6-3) should be set to the TC position. The INT/EXT1/EXT2 switch on the AE-03 board is used to select an external time code or internal time code. The TC/UB switch on the TC-14 board is used to change the time code or user bit indicator. Normally this position indicates a value read by the time code reader but when the TAPE/EE selector ① is set to INPUT, it indicates an input from the time code generator.

Note that if the tape is moved with the STEP buttons immediately after the power is turned on, the correct time code will not be displayed. Before moving the tape with the STEP buttons after the power is turned on, be sure to set the VTR to the PLAY mode so that the correct time code is read.

TIMER-1: This is used to indicate the tape running time by counting the CTL signal on the tape. It is possible to reset the tape running time to zero at any position on the tape with the RESET button ⑨. After resetting, the new tape running time is indicated.

TIMER-2: This is used to indicate the tape running time by counting the CTL signal on the tape. When the tape is threaded, the TIMER-2 cannot be reset to zero.

The information of the TIME CODE, TIMER-1 or TIMER-2 selected by this switch, which is indicated on the display, can be entered as the edit IN or OUT point.

- When the power is turned OFF with the tape threaded, the data of TIMER-1 and 2 is retained for 12 hours by means of a built-in back-up capacitor, so that the data can be used again within this period.

⑤ SERVO alarm lamp (red) and SYSTEM alarm lamp (red)

These lamps warn of improper VTR operation.

SERVO alarm lamp

This lamp lights until the servo locks or when the servo does not lock.

SYSTEM alarm lamp

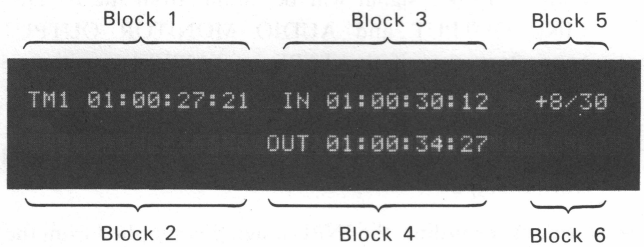
This lamp lights when the system control does not correctly function.

⑥ CF (color frame) LOCK lamp (green)

This lamp lights when the VTR is operating with its color framing locked. Color frame or non-color frame is set by the CAP LOCK switch on the CD-17 board and the CF switch on the SR-15 board. (Refer to 1-6-3.)

⑦ Display

This is a two-line, 40-character dot matrix display divided into the following six blocks:



- Eight digits with colons (:) show ×× hours, ×× minutes, ×× seconds, ×× frames.
- The data display is in the +/− mode when the S9-5 switch on the SY-80 board is set to ON, and in the 24-hour mode when the S9-5 switch is set to OFF.

Block 1

This block shows the tape running time of the recorder or player which is being operated. Either the time code or CTL count data is selected by the TIME CODE/TIMER selector (4).
The meaning of the head letters displayed before the eight digits is as follows:

TCR: Read value of the time code reader
TCG: Value from the time code generator
TM1: TIMER-1 data
TM2: TIMER-2 data
UBR: Read value of the user bit
UBG: Generated value of the user bit

- Note that when the A-3 SEL switch on the AE-03 board (refer to 1-6-3) is set to a position other than TC, all columns display "*" instead of digits, even if the time code is accessed.

Block 2

This block shows the time code or TIMER data of the player during operation in the AUTO mode when two VTRs, such as two BVH-2500 VTRs, a BVH-2500 and a BVH-2000, or a BVH-2000 and a BVU-800/820, are used for editing.
When the tape speed is less than 4/30 time normal speed and the color field data on the tape are being read, this block shows "F1", "F2", "F3" or "F4". If the data are not read, "F*" is shown.
When (1) two BVH-2500 VTRs are used, (2) the Δt recording has been preset on the recorder, (3) the CONTROL P or CONTROL R button has been pressed, and (4) color field data on the tape are being read, this block shows "P:F1" or "R:F1" ("F2", "F3" or "F4" will be displayed instead of "F1", depending upon the color field data being read).

Block 3

This block is a scroll memory register for block 4 below. The data indicated in block 4 is shifted to block 3 by the subsequent operation step.

Block 4

This block shows the data input by the 20 keys (33). It also indicates data accessed by the 20 keys. The meaning of the head letters displayed is as follows:

IN: Video and/or audio IN point
OUT: Video and/or audio OUT point
AI: Audio IN point
AO: Audio OUT point
DUR: Duration (time period between IN and OUT points) by TIMER-1
LAP: Duration by TIMER-2

Block 5

JOG mode: blank
SHUTTLE, PROGRAM JOG or PROGRAM PLAY mode: tape speed
Other mode: memorized tape speed of the PROGRAM JOG or PROGRAM PLAY
The tape speed is indicated in fractions when it is less than the normal speed and in multiples when it is over the normal speed.
Δt preset: When STILL or STEP recording in the Δt recording mode has been preset and the required conditions for Δt recording (see below) have been satisfied, "RDY STIL" or "RDY STEP" is displayed in this block.

Required conditions for STILL recording

- The Δt REC PRESET STILL button (35) illuminates.
- Color field data are being read.
- The STEP ➡ button (36) illuminates.

Required conditions for STEP recording

- The Δt REC PRESET STEP button (35) illuminates.
- Color field data are being read.

When SLOW recording in the Δt recording mode has been preset, this block shows the tape speed set by the SEARCH dial. When the selected tape speed is within the practicable range of recording, "RDY 1/60" is displayed in this block (or "1/30", "2/30", "3/30", or "4/30" will be displayed instead of "1/60", depending upon the tape speed being set).

Block 6

This block indicates malfunctions with blinking error messages.
The meaning of the letters displayed is as follows:

SYS ERR: Indicates a system error, showing that the system control CPU is not operating normally.
OVERHEAT: Indicates overheating of the power supply system or motor drive amplifier.
LINE ERR: Indicates a line error, when remote control communication is not performed correctly.
ABORT: Indicates that an editing or Δt recording operation is not performed correctly.
LOST LCK: Indicates when servo lock is lost during recording.
NEGATIVE: Indicates that the edit OUT point is placed before the edit IN point.
DATA ERR: Indicates that an invalid numerical value is set as time data (for example, 65 seconds 35 frames, etc.).
TAPE OUT: Indicates that the tape is not loaded correctly.

During STEP recording, the number of times a STEP recording has been performed is displayed by frames in this block. The number of times a STEP recording is performed with the R/P MODE selector (3) set to FIELD is displayed in 0.5 steps. The number of times a STEP recording is performed with the R/P MODE selector set to FRM is shown in 1 step. The number displayed in this block can be cleared with the C key in the 20-key section.

⑧ DISPLAY HOLD button and lamp

If this button is pressed at any position, the data displayed on display ⑦ is held. At the same time, the lamp lights up to indicate the DISPLAY HOLD mode. When this button is pressed again, the lamp goes off and the data which is being read is displayed.

⑨ RESET button

(1) TIMER-1 reset
When the RESET button is pressed any time after the TIME CODE/TIMER selector is set to TIMER-1, the TIMER-1 data indicated on display ⑦ can be reset to zero. (The TIMER-2 data cannot be reset to zero.)

(2) TIME CODE reset
After the TIME CODE/TIMER selector is set to TIME CODE, and the TAPE/EE selector ① to INPUT, the input from the time code generator is indicated on the display. The time code generator is reset to zero by pressing the RESET button in this mode.
When the user bit is displayed, the user bit is reset to zero.

⑩ STOP button

Pressing the STOP button stops all modes. The reel motor stops and the pinch roller is retracted from the tape.

- About 30 seconds after the STOP button has been pressed, the tension release mechanism is operated and the machine enters the STANDBY mode (reduced tape tension). The TENSION OFF ENABLE switch (S9-7) on the SY-79 board can be turned OFF so that the tension release mechanism does not operate.
- The machine goes into the STOP mode automatically after the power is turned on or when the tape is out of the tape sensor.
- The STOP lamp blinking shows that no reference signal is being supplied to the servo system.
- In the STOP or STANDBY mode, if the tape is too slack, the slack will be taken up automatically.

⑪ STANDBY button

This push on/push off button is used to start the drum rotating. In normal use, after the STANDBY button has been pressed, check the SERVO alarm lamp ⑤ to see that it is off and then press the desired mode button. However, it is also possible to go into the desired mode by pressing its button directly without pressing the STANDBY button. When about 9 minutes has elapsed without any button being pressed after the STANDBY button has been pressed, the STANDBY mode will be released automatically. However, if the INS or ASM button has been pressed, the STANDBY mode will not be released.

- When the STANDBY OFF ENABLE switch (S9-8) on the SY-79 board is OFF, or if either the AUTO button or one of the channel preset buttons is lit, the STANDBY mode will not be released automatically.
- If the tape sticks when the head drum starts to rotate, the tension release mechanism operates to slacken the tape.
- The STANDBY lamp blinks to show that the head drum is rotating abnormally for some reason, or is not rotating at all.

⑫ PLAY button

When the PLAY button is pressed, the PLAY and STANDBY lamps light and the machine enters the normal playback mode (normal speed playback in the forward direction). To disengage this mode, press either the STOP, JOG, SHUTTLE, VAR or PREROLL button.

- When the SEARCH dial ⑯ is turned while the PLAY button is being pressed, the machine enters the capstan override mode (refer to 1-9-7).

⑬ REC (record) button

When the PLAY button is pressed simultaneously with the REC button, both the REC and PLAY lamps light and the machine enters the record mode. To release this mode, press either the STOP, VAR, JOG, SHUTTLE or PREROLL button.

- To monitor the playback picture during recording, set the TAPE/EE selector ① to TAPE.
- When the REC INHIBIT lamp ⑭ is on, the machine enters the PLAY mode without making a recording.

⑭ REC (record) INHIBIT lamp

This lamp shows that the VTR is in the REC INHBIT mode. (For details, refer to 1-4-2.)

⑮ CONTROL P and CONTROL R buttons

With another VTR connected to the REMOTE-2 connector on the rear panel and the REMOTE switch on the SY-79 board set to REMOTE-2, set the REMOTE/LOCAL switch on the level control panel to LOCAL, and the VTR operates as a recorder. The following operations can be performed by these buttons (refer to 1-11-3):

P button lights: When the P button is pressed and the lamp lights, editing and tape transport buttons operate the connected player, enabling remote control of the player. The displays are also those of the player. However, it is impossible to remotely operate the SERVO REF ②, R/P MODE ③, and TIME CODE/TIMER ④ selectors of the player, and these selectors must be set on the player.

R button lights: When the R button is pressed and the lamp lights, this VTR operates as a recorder. If the AUTO button ㉙ is then pressed, both the recorder and the player are controlled, enabling PREVIEW, AUTO EDIT, and REVIEW to be performed.

Both P and R buttons light: When both P and R buttons are pressed and light, the two VTRs can be operated synchronously. However, it is necessary to set the PARA RUN switch on the SY-79 board to ON.

Both P and R buttons are off: When both these button lamps are off, only this VTR can be operated and communication between the recorder and player is impossible.

⑯ SEARCH dial

This dial is used to change the direction and speed of the running tape.

(1) By turning this dial during the JOG, SHUTTLE, PROGRAM JOG, or PROGRAM PLAY mode (refer to 1-9), it is possible to change the direction and speed of the running tape.

(2) If this dial is turned during the STOP, STANDBY, PLAY, or REC mode, it is possible to previously set the direction and speed of the running tape for the PROGRAM JOG or PROGRAM PLAY mode. The set speed is displayed in block 3 on display ⑦.

- When Δt recording has been preset, the tape speed for SLOW recording can be set instead of that for the PROGRAM JOG mode.

⑰ SHUTTLE button

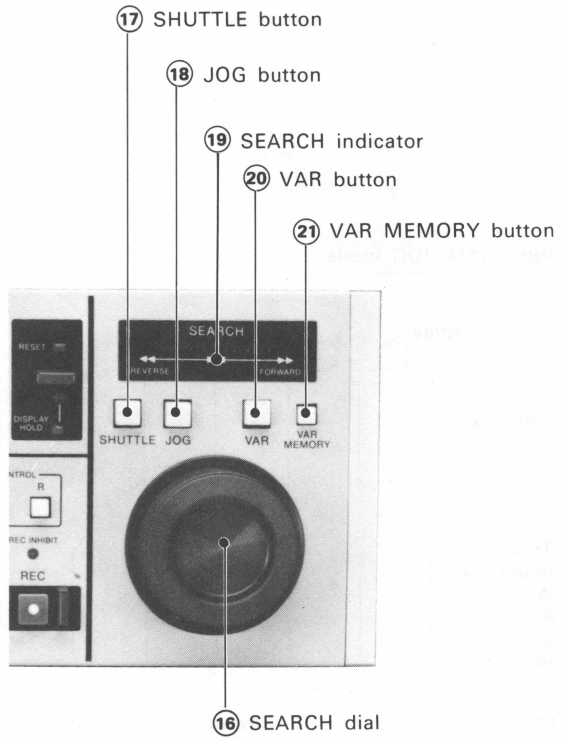
When the SHUTTLE button is pressed, the lamp lights and the machine enters the SHUTTLE mode. In this state, if the SEARCH dial ⑯ is turned to either the right or left and stopped at any position, playback will be at the speed corresponding to the dial position (1/32 to 50 times normal). At the center position, a still picture is obtained. The SEARCH dial clicks at the center and ±50 times normal speed positions.

- For fast winding in the forward direction, the winding speed is reduced automatically at the end of the tape, when the unit stops automatically. If you wish to wind the tape completely, turn the SEARCH dial again to the right or set the EOT STOP switch on the SY-80 board to OFF.
- For fast winding in the reverse direction (rewinding), the tape speed is reduced automatically at the beginning of the tape and stops automatically near the TIMER-2 zero set position.
- If you wish to rewind the tape completely, turn the SEARCH dial again to the left or set the EOT STOP switch on the SY-80 board to OFF.
- If the STILL mode is held for 5 minutes or more, the machine enters the STOP mode automatically to prevent damage to the tape. If you don't want the machine to stop, set the STILL OFF ENABLE switch (S9-6) on the SY-79 board to OFF.

⑱ JOG button

When the JOG button is pressed, the lamp lights and the machine enters the JOG mode. In this state, when the SEARCH dial is turned to either the left or right, the playback speed depends on the speed of rotation of the dial (0 to several times normal). When turning of the dial stops, the picture will remain at that dial position. The SEARCH dial does not click.

- If the STILL mode is held for 5 minutes or more, the machine will go into the STOP mode automatically. If you don't want the machine to stop, set the STILL OFF ENABLE switch (S9-6) on the SY-79 board to OFF.

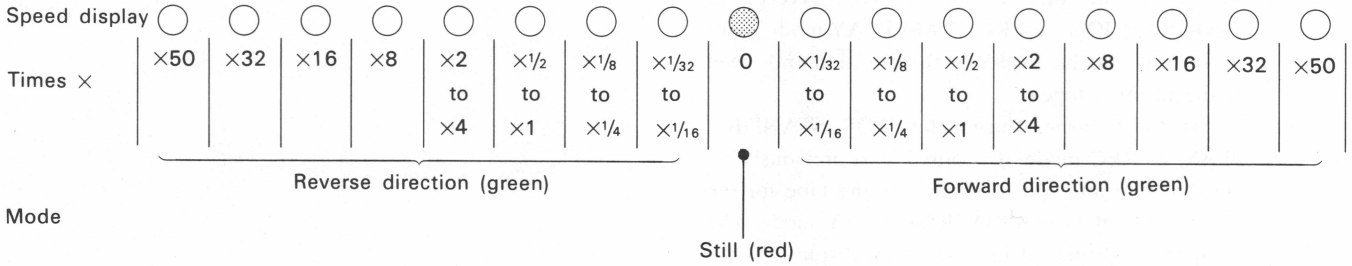


⑲ SEARCH indicator

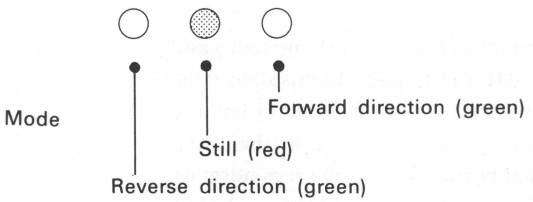
This indicates the operation mode of the SEARCH dial. While in the SHUTTLE, JOG or PROGRAM JOG mode (described in ⑳), the lamps light as shown below, according to the dial operation, to indicate the speed and direction of the tape.

Note: When the tape comes near the end, the still, forward or reverse direction indicators blink.

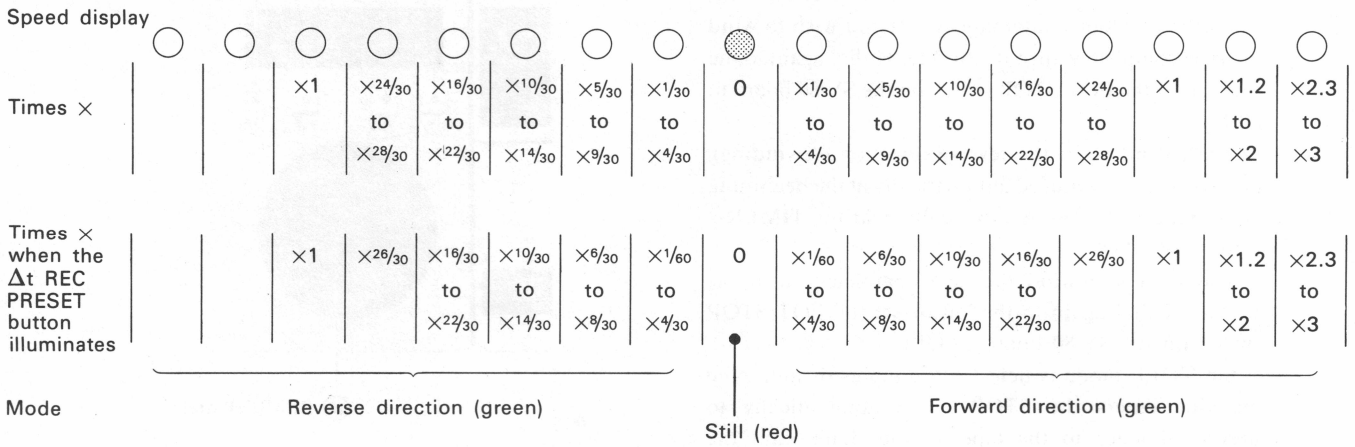
SHUTTLE mode



JOG mode



PROGRAM JOG mode

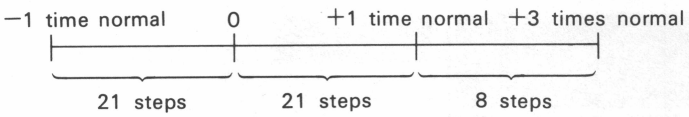


⑳ VAR (variable) button

When the VAR button is pressed, the lamp lights and the machine enters the PROGRAM JOG or PROGRAM PLAY mode. These modes are selected by the VAR switch on the SY-79 board.

PROGRAM JOG mode:

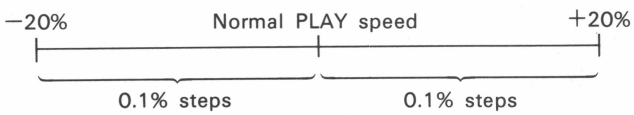
After the VAR switch on the SY-79 board has been set to the P.JOG position, pushing the VAR button places the machine in the PROGRAM JOG mode. If the SEARCH dial is turned to the left or right and the rotation is stopped at any position, playback will be at a speed (−1 to +3 times normal) corresponding to the dial position. The dial clicks at the −1, 0, +1, and +3 times normal speed positions. Noiseless playback is possible over the entire range (−1 to +3 times normal) of the dial in this mode. This mode is also available as a vernier function in the usual SHUTTLE mode (−50 to +50 times normal). The speed can be set to the following 50 steps:



The set speed is displayed in block 5 on display ⑦ in fractions or decimals.

PROGRAM PLAY mode:

VAR button and PLAY button can turn the mode into PROGRAM PLAY if pushed altogether after setting the VAR switch on the SY-79 board to P.PLY. Then turn the SEARCH dial to the left or right while depressing the VAR button and stop at the desired position, and playback is performed at the speed corresponding to the dial position (−20% to +20%). Noiseless playback is possible in this mode as in the PROGRAM JOG mode over the entire dial range. This mode can be used, in the same way as above, as a vernier function in the usual SHUTTLE mode. Speed setting is adjustable in 0.1% units up to ±20% the normal PLAY speed.



The set speed is displayed in block 5 on display ⑦ in "%".

Tape speed presetting is possible by turning the SEARCH dial with the VAR button depressed in the STOP, STANDBY, PLAY or REC mode. After presetting, PROGRAM PLAY begins at the preset speed by pushing the PLAY button and VAR button at the same time.

Note that the VTR does not enter the SLOW REC mode while it is in the PROGRAM PLAY mode.

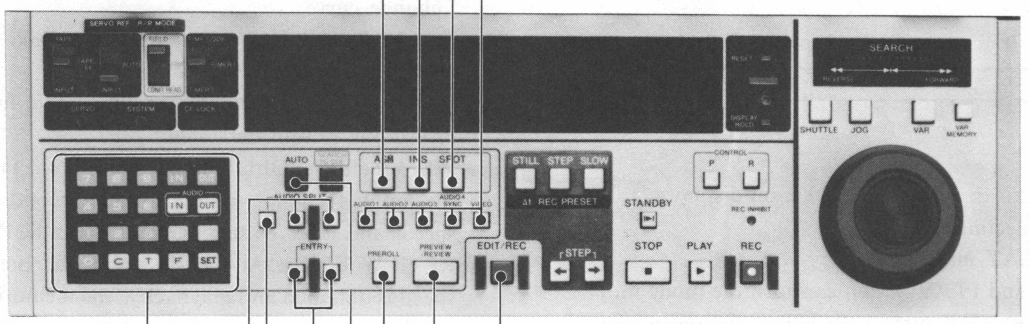
㉑ VAR (variable) MEMORY button

The SEARCH dial operations (change of speed and direction of tape running) in the PROGRAM JOG mode are memorized, so that the operations stored in memory can be performed again.

1. Press both the AUTO and VAR MEMORY buttons.
2. Start the tape running and enter the start point to be memorized using the ENTRY IN button.
   Preset the initial speed using the SEARCH dial.
3. Press the PREROLL and PREVIEW/REVIEW buttons simultaneously.
   The tape will run at the preset initial speed.
4. When the tape passes the IN point, a buzzer sounds. After that, when the SEARCH dial is operated, the operation curve of the dial is memorized.
5. Stop the tape with the STOP button.
6. Press the PREVIEW/REVIEW button and the changes of the SEARCH dial from the start to stop points will be reproduced and the tape will run according to the change curve.

- The VAR MEMORY button lamp blinks until the change curve memory becomes full.
  When the lamp becomes continuously lit, further dial operations cannot be stored.
- When the PREROLL button is pressed, the tape runs to the point [IN point − preroll time (seconds) × initial speed], and stops. To start playback, press the PREVIEW/REVIEW button. At the IN point, the preset initial speed is obtained and playback at the memorized speed continues.

1-4-4. Function Control Panel — for Editing



(22) ASM button

(23) INS button

(24) SPOT erase button

(25) Channel preset buttons
AUDIO 1 button
AUDIO 2 button
AUDIO 3 button
AUDIO 4 SYNC button
VIDEO button

(26) EDIT/REC button

(27) PREVIEW/REVIEW button

(28) PREROLL button

(29) AUTO button

(30) ENTRY IN button
ENTRY OUT button

(31) AUDIO SPLIT button

(32) AUDIO SPLIT IN button
AUDIO SPLIT OUT button

(33) 20-key section

㉒ ASM (assemble) button

If the ASM button is pressed while the VTR is in the STOP or PLAY mode, an ASSEMBLE editing can be made. To release the ASSEMBLE editing mode, press the button again. In ASSEMBLE editing, the video signal and the CTL signal are recorded simultaneously on the tape.

Pressing the ASM button turns on all the channel preset buttons ㉕ (the lamps light). Press the buttons for channels not used for editing to turn them off (the lamps go off). If all of the channel preset buttons are turned off, the machine will not go into the ASSEMBLE mode. Since the VIDEO and SYNC channels are interlocked with each other, it is impossible to record only one of these two channels. When assembling only the AUDIO channels, the VIDEO signal should have already been recorded and the capstan servo must be locked by the CTL signal. The AUDIO channel can be switched ON or OFF while performing an ASSEMBLE edit; on the other hand, the VIDEO channel cannot be released during editing because once it has been switched ON, the state is held.

When assemble-editing the video signal only, the sound being monitored is affected by the CTL signal and the sound quality is impaired, but the recorded signal is not affected.

- No audio and no video signals are recorded in a part just behind the OUT point of the ASSEMBLE editing.

㉓ INS (insert) button

Pressing the INS button while the VTR is in the STOP or PLAY mode allows INSERT editing. To release the INSERT editing mode, press the button again. In INSERT editing, the CTL signal, which has already been recorded on the tape, is used as the reference signal. Therefore, the playback picture is not distorted at the edit IN and OUT points. When the INS button is pressed, each channel preset button ㉕ is kept OFF (lamps off), so press the desired channel select buttons to turn them ON.

Each channel can be switched ON or OFF during INSERT editing.

- Setting the V/S SIMUL switch (S1-1) on the LG-04 board to ON allows both sync and video signals to be selected simultaneously; turning the switch OFF allows either of them to be selected independently.

㉔ SPOT erase button

This button is used to partially erase the AUDIO channels.

(1) Manual spot erase:
If the SPOT button is pressed while the VTR is in the STOP or STANDBY mode, the VTR enters the SPOT ERASE mode. Select the AUDIO channels to be erased with the channel preset buttons ㉕ and press the EDIT/REC button ㉖ . While the EDIT/REC button is being depressed, the signal on the selected channel is erased. Rotating the take-up reel (right side) by hand to the right and left several times to make the tape run manually while depressing the EDIT/REC button erases that portion of tape. To release the MANUAL SPOT ERASE mode, press the SPOT button again or push another operation button.
Note: Be sure to release the EDIT/REC button **while the tape is running.**

(2) Automatic spot erase:
Press the AUTO button ㉙ (the lamp lights) and enter the cut-in and cut-out points between which the audio signals are to be erased with the ENTRY IN and OUT buttons. Press the SPOT button and the machine enters the AUTO SPOT ERASE mode. Then press the AUDIO SPLIT button ㉛ and select the audio channels to be erased with the channel preset buttons ㉕ . Press the STOP button. After that, when the PREVIEW/REVIEW button ㉗ is pressed, the audio is muted between the IN and OUT points. Thus it is possible to check that the interval to be erased is correct. Then pushing the EDIT/REC button ㉖ allows the actual erase to take place. The AUTO SPOT ERASE mode is released automatically after the completion of the erase.

㉕ Channel preset buttons (AUDIO 1, AUDIO 2, AUDIO 3, AUDIO 4 / SYNC, and VIDEO)

When ASSEMBLE editing, INSERT editing or SPOT ERASE is to be made, select the desired channels with these buttons.

AUDIO 1: The AUDIO-1 channel is selected.

AUDIO 2: The AUDIO-2 channel is selected.

AUDIO 3: The AUDIO-3 channel is selected.

- Turning ON the TC INS INHIBIT switch (S1-2) on the LG-04 board allows the INSERT mode to be inhibited when the AUDIO-3 channel is in the time code input mode.

AUDIO 4 / SYNC: The SYNC channel is selected.

- Turning ON the V/S SIMUL switch (S1-1) on the LG-04 board allows both the SYNC and VIDEO channels to be selected simultaneously.

VIDEO: The VIDEO channel is selected.

㉖ EDIT/REC (record) button

This button is used to carry out editing modes and Δt recording modes. (For Δt recording, refer to 1-4-5.)

(1) Manual editing:
If either one of the INS, ASM, and SPOT buttons has been pressed (the lamp lights) and the system servo is locked in the PLAY mode, pressing the EDIT/REC button allows manual editing to be performed. To release the manual editing, press the EDIT/REC button again.

(2) Automatic editing:
When either one of the INS, ASM and SPOT buttons and the AUTO button have been pressed (the lamps light) and the ENTRY IN button has been pressed (the lamp lights), pressing the EDIT/REC button allows an automatic edit to be performed.

- Editing is performed in frame units. However, in manual editing of AUDIO only, the editing is done in field units.
- The even/odd field of edit IN and OUT points is designated by the EDIT switch on the SY-80 board.
- To perform a SPOT ERASE, both the IN and OUT points should be entered.
- Even if all the channel preset buttons are set to OFF during editing, the EDIT/REC button remains illuminated and the editing mode is kept. Press the appropriate channel preset button(s) again, and the recording of the channel(s) will start again.

㉗ PREVIEW/REVIEW button

This button has the dual purpose of PREVIEW and REVIEW. After the data necessary for automatic editing has been entered with the appropriate buttons, if the edit has not yet been performed, the button operates as a PREVIEW button. If the edit has been carried out, and if the next edit data has not been set yet, the button operates as a REVIEW button.

PREVIEW:

After the AUTO button and either one of the ASM, INS and SPOT buttons have been pressed and the edit IN and OUT points have been entered, the PREVIEW operation is carried out when the PREVIEW/REVIEW button is pressed.

The following four PREVIEW operations are available:

(1) Full PREVIEW of the recorder and player:
Pressing the CONTROL R button ⑮ (the lamp lights) of the VTR being operated and pressing the PREVIEW button allows both the recorder and the player to have full PREVIEW operation. The rehearsal picture and audio can be checked for the whole period of editing by the recorder monitor.

(2) PREVIEW of the player:
After pressing the CONTROL P button ⑮ (the lamp lights) of the VTR being operated, pressing the PREVIEW/REVIEW button allows only the player to be operated.

(3) PREVIEW of the recorder:
After turning OFF the CONTROL P and R buttons (the lamps go off) of the VTR being operated, pressing the PREVIEW/REVIEW button allows only the recorder to be operated.

(4) PREVIEW of the OUT point (refer to 1-11-8):
If the PREVIEW/REVIEW button is pressed while the OUT button ㉝ is kept pressed, the part near the OUT point can be previewed.
The VTR to be operated in OUT point preview can be selected by the CONTROL P and/or R buttons as in the above items (1), (2) and (3).

The preview time can be set by the P.ROL TIME switch on the SY-79 board.

- In the ASSEMBLE editing mode, the VTR plays back the tape up to the IN point and stops there, and the E-to-E picture can be seen for about 2 seconds.
- When Δt recording has been preset (the STILL or STEP button lights), the PREVIEW/REVIEW button has a different function. (Refer to 1-13-1.)

㉘ PREROLL button

If one or more of the ENTRY IN, ENTRY OUT, AUDIO IN, and AUDIO OUT buttons are pressed to enter the edit point(s), the edit point(s) can be prerolled. When the PREROLL button is pressed, the tape runs and stops at the prerolled point.

The preroll time can be set from 0 to 15 seconds in units of one second using the P.ROL TIME switch on the SY-79 board.

The following two preroll operations are available:

(1) Preroll of the earlier IN point of either video or audio:
If only the PREROLL button is pressed, the earlier IN point (either the video IN or the audio IN point) is prerolled. If there is only one IN point, that point is prerolled.

(2) Preroll of the video or audio IN/OUT points:
If one of the following buttons in the 20-key section ㉝ is held down and then the PREROLL button is pressed, the following point will be prerolled:
IN button: video IN point
OUT button: video OUT point
AUDIO IN button: audio IN point
AUDIO OUT button: audio OUT point

- If the READ switch on the TC-14 board is set to VITC position and the TIME CODE/TIMER selector ④ is set to TIME CODE, the preroll function does not work.

㉙ AUTO button

This button is used to set the automatic editing mode. Pushing this button ON (lamp lights) allows ENTRY IN, ENTRY OUT, AUDIO SPLIT IN, AUDIO SPLIT OUT, PREROLL, PREVIEW, AUTO EDIT and REVIEW to be performed. To release the automatic editing mode, press the AUTO button again (lamp goes out).
When Δt recording has been preset, the AUTO button has a different function. (Refer to 1-13-1.)

㉚ ENTRY IN and ENTRY OUT buttons

These buttons are used for editing IN and OUT point entry. If the ENTRY IN (or ENTRY OUT) button is pressed when the AUTO button ㉙ is ON, the data displayed in block 1 on display ⑦ is entered as the IN point (or OUT point) and the lamp lights. The entered data is used for PREROLL, PREVIEW, AUTO EDIT and REVIEW operations.

- If the ENTRY IN or OUT button is pressed while the VTR is in the PLAY or REC mode (the tape is running), the reaction time is subtracted from the data shown on the display and this value is entered as the IN or OUT point. Reaction time is set to compensate for the delay caused by the manual operation of the buttons. It can be set from 0 to 30 frames in 2-frame units using the REACT TIME switch on the SY-79 board.
- If the OUT point is entered before the IN point, an alarm message "NEGATIVE" blinks on the display and neither PREVIEW nor AUTO EDIT can be performed. If this happens, enter the IN and OUT points again correctly.
- When the AUTO button is OFF, the entered data is used for the PREROLL operation.

㉛ AUDIO SPLIT button

When this button is pressed, the VTR is set to the AUDIO SPLIT mode (lamp lights) and the audio IN and OUT points can be entered independently of the video using the AUDIO SPLIT IN and OUT buttons ㉜ . The ENTRY IN and OUT buttons operate as the entry buttons for the video and sync. Pressing the AUDIO SPLIT button again to turn it OFF returns the unit to the state where both the video and audio edit points can be entered with the ENTRY IN and OUT buttons.

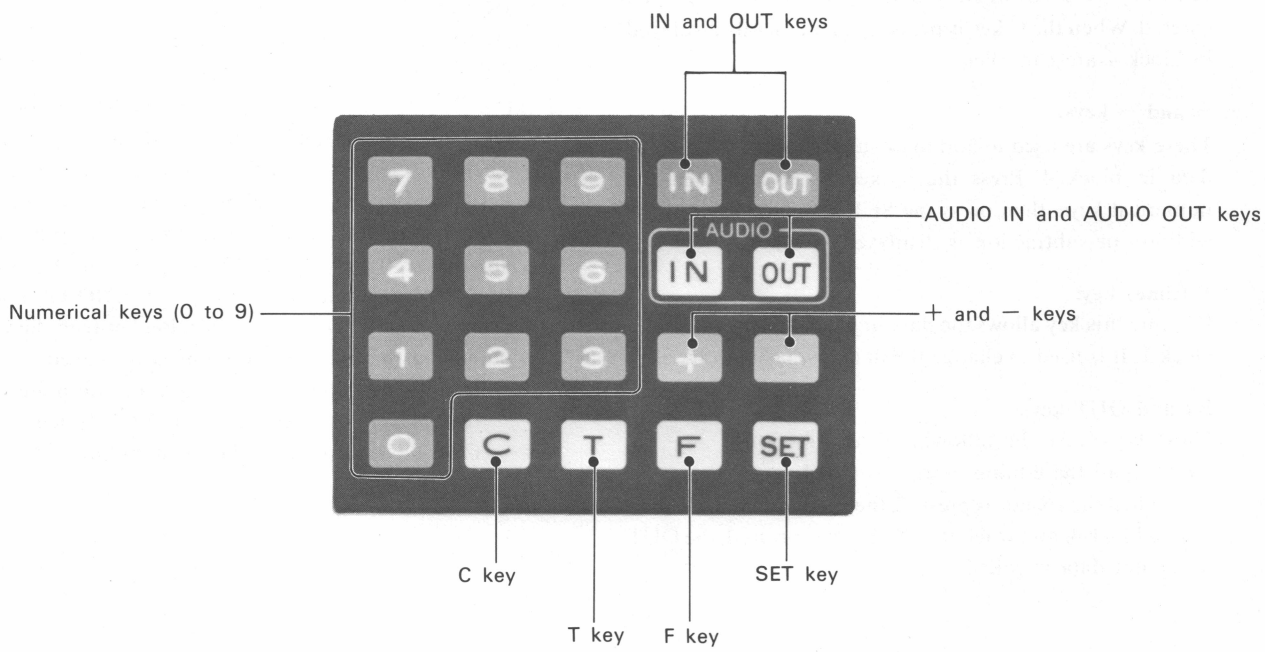
㉜ AUDIO SPLIT IN and AUDIO SPLIT OUT buttons

These buttons are used to enter the AUDIO IN and OUT points while the VTR is in the AUDIO SPLIT mode. When the AUDIO SPLIT IN or AUDIO SPLIT OUT button is pressed, the data displayed in block 1 on the display is entered as the AUDIO IN or OUT point and the lamp lights. The entered data is used for PREROLL, PREVIEW, AUTO EDIT, and REVIEW operations.

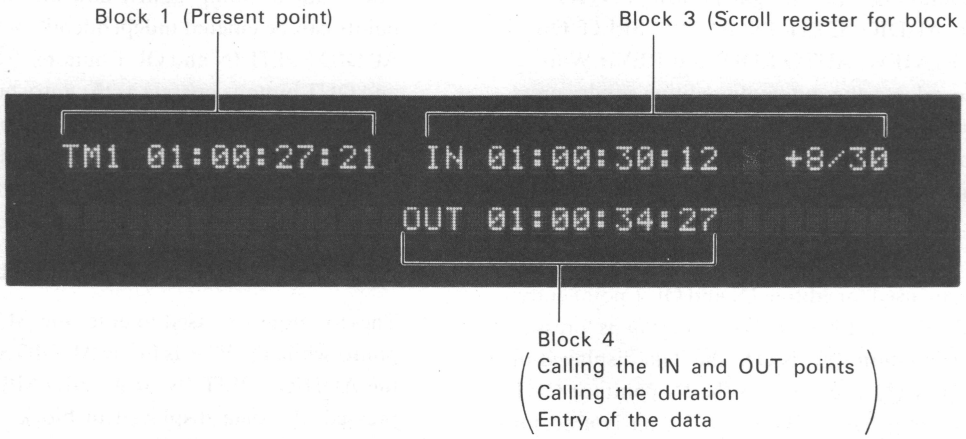
- If the AUDIO SPLIT IN or OUT button is pressed during PLAY or REC mode, the value of the data displayed on the display subtracted by the reaction time is entered as the AUDIO IN or OUT point. The reaction time can be set from 0 to 30 frames using the REACT TIME switch on the SY-79 board.

㉝ 20-key section

Numerical keys (0 to 9):
These keys are used to input numerals. When the keys are pressed, the numerals appear in block 4 on the display.



Display relating to the 20 keys



F (function) key:
This key is used to input hexadecimal numbers. Keys from 0 to 5 are pressed simultaneously with the F key to enter the hexadecimal values from A to F.
The key combinations are as follows:

F & 0 : A	F & 3 : D
F & 1 : B	F & 4 : E
F & 2 : C	F & 5 : F

SET key:
After confirming that the numerals input to block 4 with the numerical keys or F key are correct, set the numerals by pressing the SET key.

C (clear) key:
This key is used when incorrect numbers have been entered. When the C key is pressed, the numerals displayed in block 4 are cancelled.

+ and − keys:
These keys are used to add to or subtract from the display data in block 4. Press the + key or − key, then the numerical keys, then press the SET key. The result of the addition or subtraction is displayed in block 4.

T (time) key:
Pressing this key allows the data in block 4 to be entered to block 1. It is used to change the data displayed in block 1.

IN and OUT keys:
These keys have the following three functions:
(1) To call the editing point — CALL —
When the IN key is pressed, the IN point data is called to block 4, and when the OUT key is pressed, the OUT point data is called.
(2) To trim the edit point entry — TRIM —
When the data is displayed in block 4, the data in block 4 is entered as the IN point when the IN key is pressed and as the OUT point when the OUT key is pressed. Trim may be in frame units. The trimmed result is displayed in block 4.
(3) To indicate the length of the edit interval
— DURATION and LAP —
When the IN and OUT keys are pressed simultaneously, the length of the edit interval (from IN point to OUT point), that is, the duration, is displayed in block 4. When the displayed data is that of TIMER-1, "DUR" is displayed and when the data is that of TIMER-2, "LAP" is displayed.

AUDIO IN and AUDIO OUT keys:
These keys are used during the AUDIO SPLIT operation. These keys have the following three functions similar to the IN and OUT keys:
(1) To call the audio edit point
(2) To trim the audio edit point
(3) To indicate the length of the audio edit interval
Operation is the same as for the IN and OUT keys.
The audio channel to be called, trimmed or indicated is designated by the channel preset buttons ㉕ . The length of the editing interval in item (3) can also be indicated with any two of the IN, OUT, AUDIO IN, and AUDIO OUT keys. (For example, if the IN and AUDIO OUT keys are pressed simultaneously, the duration between the video IN point and the audio OUT point is displayed.)
- In any operation of the 20 keys, the edit point of either the player or recorder can be selected with the CONTROL P or CONTROL R button ⑮ .

Examples:

Setting the time code

Preparation
- VTR → STOP or STANDBY mode
- Set the display to the time code display mode. (Set the TC/UB switch on the TC-14 board to TC. If time code has been set to the REC RUN mode, setting is easy since the time code display is not changed.)
- TIME CODE/TIMER selector ④ → TIME CODE

Operation

Display

1. TAPE/EE selector ① → INPUT

TCG 01 : 00 : 27 : 21		

The time code generated at the time code generator is displayed in block 1.

2. [0], [0], [0], [0], [3], [0], [0], [0], [SET]

TCG 01 : 00 : 27 : 21		
	SET 00 00 30 00	

Input the desired data using the numerical keys. The entered data is input to block 4.
- If wrong data was entered, cancel it by using the [C] key and input the correct data.

3. [T]

TCG 00 : 00 : 30 : 00		

The desired data is entered to block 1 and set as the start point value of the generator.

Setting the user bit

Preparation
- VTR → STOP or STANDBY mode
- Set the display to the user bit display mode. (Set the TC/UB switch on the TC-14 board to UB.)
- TIME CODE/TIMER selector ④ → TIME CODE

Operation

Display

1. TAPE/EE selector ① → INPUT

UBG 01 00 30 15		

The user bit generated at the time code generator is displayed in block 1.

2. [0], [F] and [0] (push simultaneously), [0], [0], [2], [0], [1], [0], [SET]

UBG 01 00 30 15		
	SET 0A 00 20 10	

Input the desired data to block 4.
- By pushing the [F] and [0] keys simultaneously, a hexadecimal number can be input.

3. [T]

UBG 0A 00 20 10		

The desired data is entered to block 1 and is set as the user bit.

Setting the TIMER-1

Preparation TIME CODE/TIMER selector ④ → TIMER-1

Operation	Display	
1. Run the tape and stop it at any position.	TM1 01 : 00 : 27 : 21	The preset data of TIMER-1 is displayed in block 1.
2. [0],[0],[0],[0],[3],[0],[0],[0], [SET]	TM1 01 : 00 : 27 : 21 SET 00 00 30 00	Input the desired data to block 4. • If "DATA ERR" blinks, invalid time data has been entered. Input the correct data after pushing the [C] key.
3. [T]	TM1 00 : 00 : 30 : 00	The desired data is entered to block 1 and is set as the present point of TIMER-1.

• The data cannot be preset when the TIMER-1 is in the +/− display mode (the S9-5 switch on the SY-80 board is set to ON).

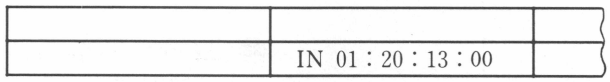
Entry of the editing point

Operation	Display	
1. [0],[1],[1],[0],[1],[5],[1],[6] [SET]	SET 01 10 15 16	Input the desired data to block 4.
2. [IN]	IN 01 : 10 : 15 : 16	The data which has been entered is set to block 4 as the IN point. The OUT, AUDIO IN, and AUDIO OUT points can also be entered in the same way.

Calling and trimming of the editing point

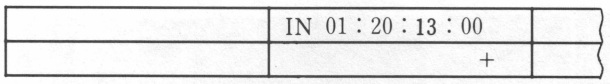
Operation

1. [IN]



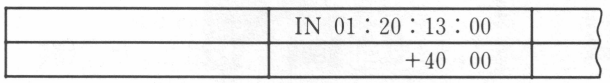
The IN point data which has been entered is displayed in block 4.
The OUT, AUDIO IN, and AUDIO OUT points can also be displayed in the same way.

2. [+] (or [−])



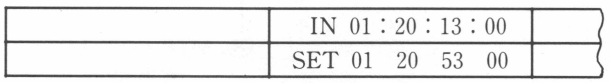
This is an example of trimming by addition.
The IN point data is shifted to block 3. "+" is entered in block 4.

3. [4], [0], [0], [0]



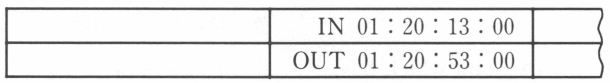
Enter the number which you want to add in block 4.

4. [SET]



The result of the addition is displayed in block 4.

5. [OUT]



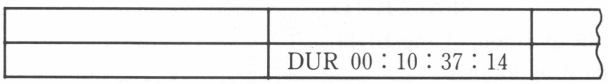
The desired data is entered as the OUT point and is displayed in block 4.

- If "NEGATIVE" blinks, the IN point has been set after the OUT point, or vice versa, and should be corrected.

Display of duration

Operation

Press the IN and OUT keys simultaneously.

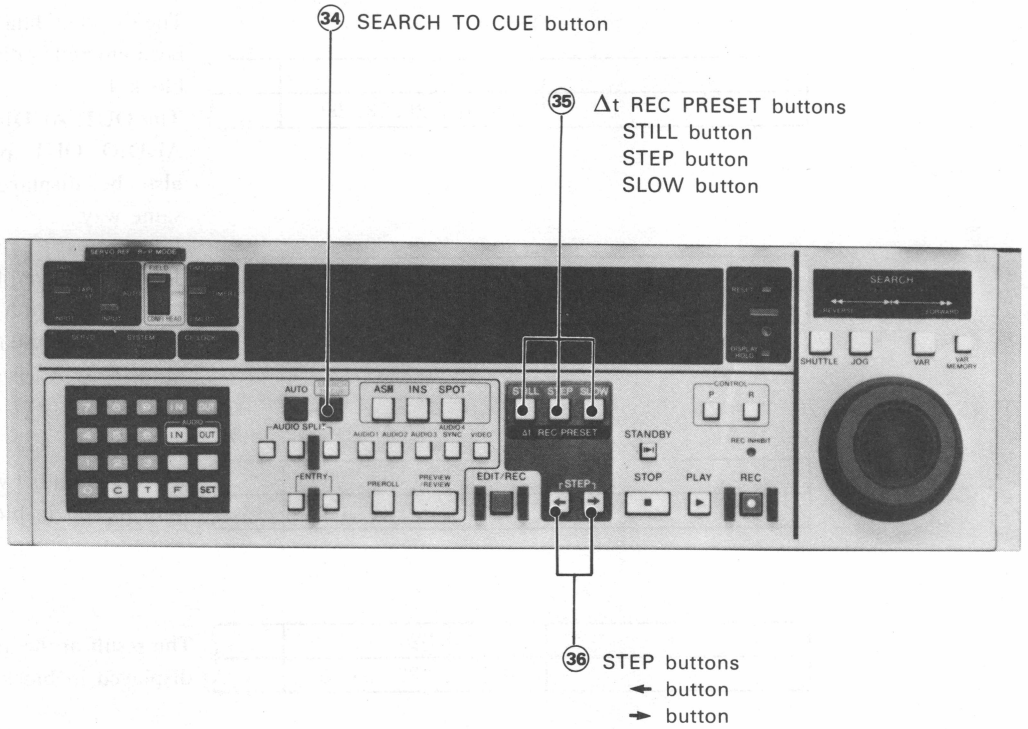


The duration of the edit interval between the IN point and OUT point is displayed in block 4.

- Duration between any two of the IN, OUT, AUDIO IN and AUDIO OUT points can be displayed.
- When the display shows TIMER-1 data, "DUR" is displayed and when it indicates TIMER-2 data, "LAP" is displayed. After the tape has been loaded, TIMER-2 cannot be reset to zero. Therefore, it is recommended that the first editing event IN point be previously entered in TIMER-2 of the recorder and the actual IN and OUT points be entered with TIMER-1 or time code.

After the editing of several events has been performed, display the data of the TIMER-2 of the recorder and press the IN and OUT buttons simultaneously. Doing this makes it possible to know the total edit duration (LAP) of all the events up to that moment.

1-4-5. Function Control Panel — for Δt Recording



㉞ SEARCH TO CUE button

This button is used to search for the IN point which has been entered with the appropriate keys of the 20-key section ㉝ or the ENTRY IN button ㉚.

When this button is pressed, the tape runs in the forward or reverse direction to search for the IN point. When the tape runs in reverse, it will pass the IN point, and then run in the forward direction stopping at the IN point. The VTR enters the still mode and the lamp of the ► button ㊱ remains illuminated. In this condition, all required conditions for the STILL or STEP recording have been satisfied, and "RDY STILL" or "RDY STEP" is displayed in block 5 on the display ⑦.

- The field at which the tape stops in the SEARCH TO CUE mode depends upon the position of the EDIT switch (S6) on the SY-80 board as follows:
  F2: field 2 or field 4
  F1/F2: field 1 or field 3
  F1: field 1 or field 3

㉟ Δt REC PRESET buttons

These buttons are used to select a recording mode for Δt recording: STILL recording, STEP recording or SLOW recording. The recording selected with one of the Δt REC PRESET buttons is performed when the EDIT/REC button ㉖ is pressed. The unit of recording or moving of the tape one step at a time is selected in terms of FIELD or FRM (frame) with the R/P MODE selector ③.

STILL button: When this button is pressed, a recording is made while the tape remains still (STILL recording).

STEP button: When this button is pressed, the tape moves forward by one unit (the unit of tape motion is selected with the R/P MODE selector ③), then a still recording is made on that portion (unit) of the tape (STEP recording).

- The number of times that the same STEP recording is to be made can be set with the STEP n switch on the SY-80 board.
  When the STEP n switch is set to "n" ("n" is a number from 0 to 15), the STEP recording is made "n" times when the EDIT/REC button is pressed once. (When the STEP n switch is set to "0" or "1", the recording is made once.)

SLOW button: When this button is pressed, a recording is made while the tape is running at a very slow speed of 1/60, 1/30, 2/30, 3/30 or 4/30 of normal speed (SLOW recording). The tape speed for SLOW recording can be set with the SEARCH dial ⑯.

- The SLOW button does not activate when the VAR switch on the SY-79 board is set to P. PLY.

When these buttons are pressed, the lamp of the buttons will illuminate. When either the STILL, STEP or SLOW button illuminates and the required conditions of Δt recording are satisfied, "RDY STIL", "RDY STEP" or "RDY 1/60" ("1/30", "2/30", "3/30" or "4/30" is displayed instead of "1/60", depending upon the selected tape speed) is displayed in block 5 on the display ⑦, depending upon the selected Δt recording mode. When the EDIT/REC button ㉖ is pressed while one of these indications is shown on the display ⑦, the selected Δt recording is performed. When the EDIT/REC button is pressed while the above indication is not shown on the display, Δt recording will not be made. When the AUTO button ㉙ is pressed while one of the Δt REC PRESET buttons is lit, the tape runs in the reverse direction and then in the forward direction until it stops at the position where the AUTO button was pressed. (At this point, the required conditions for Δt recording are satisfied and "RDY STIL", "RDY STEP" or "RDY ×/××" is displayed on the display.)

When the PREVIEW/REVIEW button ㉗ is pressed while "RDY STIL" or "RDY STEP" is displayed in block 5 on the display ⑦, the video output signal mode alternates between E-to-E mode and playback mode field by field. (This alternate mode is available only when the S2 switch on the DT-04 board is set to FIELD or REM and the R/P MODE selector ③ is set to FIELD.) The ratio of the E-to-E mode to the playback mode can be selected with the EE/PB MULTI switch on the LG-04 board as follows.

Position of the EE/PB MULTI switch	Ratio of E-to-E mode to playback mode (Of 32 fields, the figure in the numerator indicates the number of fields which are in the E-to-E mode, and the remainder of the 32 fields is in the playback mode.)
0	1/32
1	1/32
2	2/32
3	3/32
4	4/32
5	5/32
6	6/32
7	7/32
8	8/32
9	
10	
11	
12	
13	
14	
15	

㊱ STEP buttons

When these buttons are pressed, the tape moves in the forward or reverse direction by one step (unit), field (FIELD) or frame (FRM), selected with the R/P MODE selector ③.

→button: The tape moves in the forward direction by one step.

←button: The tape moves in the reverse direction by one step.

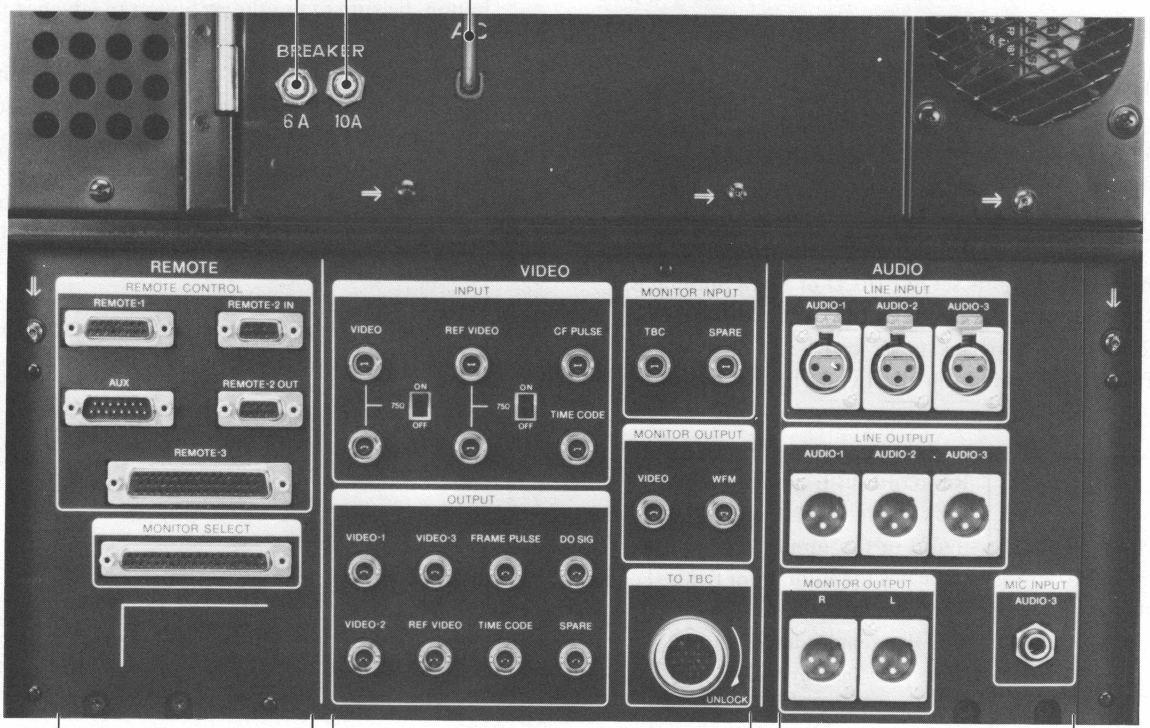
While the tape is running after either of the STEP buttons has been pressed, the lamp of the JOG button ⑱ as well as the lamp of the→or←button illuminate, and the VTR is in the still mode. When the tape has finished moving, the lamp of the JOG button goes off. (The lamp of the→or← button remains illuminated and the VTR remains in the still mode.) When a point on the tape at which a STILL recording is to be made is searched for using the→or← button, be sure to use the→button to advance the tape in the forward direction as the last step. (A STILL recording cannnot be made if the tape is moved in the reverse direction on the last step with the←button.) To start the STEP recording, first press the←button once to move the tape in the reverse direction by one step. The tape then advances automatically in the forward direction by one step when the STEP recording starts, and the STEP recording is made at that position.

For details on Δt recording, refer to "1-13. Δt RECORDING".

1-4-6. Connector Panel

Circuit breakers

AC power cord
Connect this cord to the AC power source having a voltage fluctuation of less than 10%.

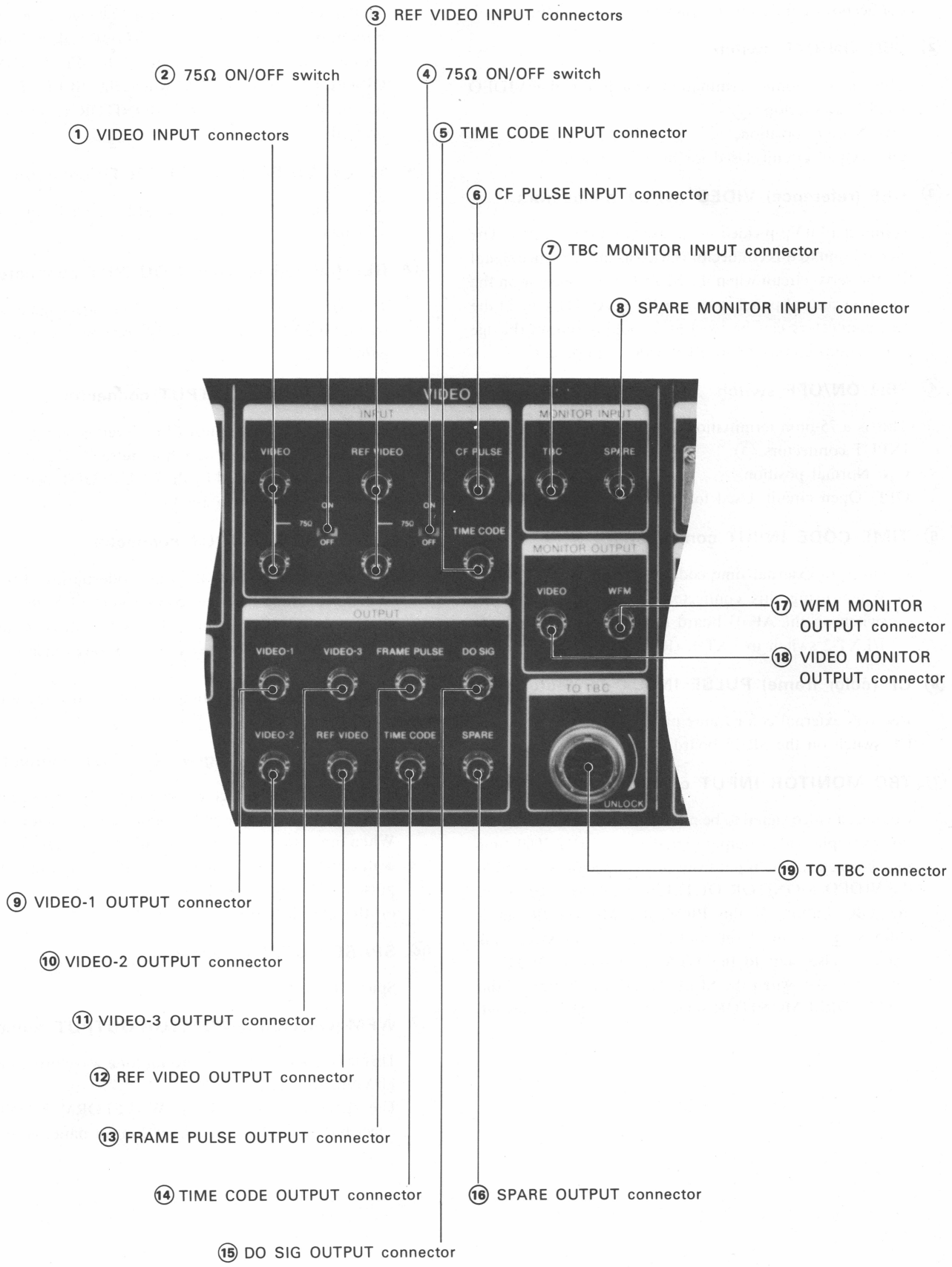


Remote connector panel

Video connector panel

Audio connector panel

Video connector panel



① VIDEO INPUT connectors

Connect a video signal of 1.0 Vp-p. One of the two connectors can be used as a looping output (bridge connection) connector to other video equipment.

② 75Ω ON/OFF switch

This is a 75-ohm termination switch for the VIDEO INPUT connectors ①.
ON: Normal position.
OFF: Open circuit. Used for bridge connections.

③ REF (reference) VIDEO INPUT connectors

Connect a 1.0 Vp-p video signal used for external sync. The signal input to this connector is used as the reference signal for the servo circuit when the SERVO REF selector on the function control panel is set to EXT or AUTO. One of the two connectors can be used as a looping output (bridge connection) connector to other video equipment.

④ 75Ω ON/OFF switch

This is a 75-ohm termination switch for the REF VIDEO INPUT connectors ③.
ON: Normal position.
OFF: Open circuit. Used for bridge connections.

⑤ TIME CODE INPUT connector

Connect an external time code (0.5 Vp-p).

- When using this connector, set the MIC/LINE/TC switch on the AE-03 board to TC and the INT/EXT-1/EXT-2 switch to EXT-1. (Refer to 1-6-3.)

⑥ CF (color frame) PULSE INPUT connector

Receives external color frame pulse (TTL level) when the CF switch on the SR-15 board is set to EXT.

⑦ TBC MONITOR INPUT connector

Connect a video signal to be monitored on a video monitor (for example, video output signal of the BVT-2000 time base corrector). The input from this connector is routed to the VIDEO MONITOR OUTPUT connector ⑱ when the TBC button of the PICTURE MONITOR select buttons ⑤ on the level control panel is pressed. This signal is also sent to the WFM MONITOR OUTPUT connector ⑰ when the SELECT VIDEO button of the WAVEFORM MONITOR select buttons ⑫ is pressed.

⑧ SPARE MONITOR INPUT connector

Connect a signal to be monitored on a video monitor. The input from this connector is routed to the VIDEO MONITOR OUTPUT connector ⑱ when the SPARE button of the PICTURE MONITOR select buttons is pressed. The signal is also sent to the WFM MONITOR OUTPUT connector ⑰ when the SELECT VIDEO button of the WAVEFORM MONITOR select buttons is pressed.

⑨ ⑩ ⑪ VIDEO-1/2/3 OUTPUT connectors

These connectors output a video signal of 1.0 Vp-p, 75 ohms.

⑫ REF (reference) VIDEO OUTPUT connector

This connector outputs the reference video signal selected by the SERVO REF selector ② on the function control panel.

⑬ FRAME PULSE OUTPUT connector

Playback color frame pulse (TTL level) is output from this connector. Three kinds of output pulse, REF-2, REF-4 and PB CF, can be selected by the PULSE OUT switch on the SR-15 board. (Refer to 1-6-3.)

⑭ TIME CODE OUTPUT connector

This connector outputs the time code pulses of 0.5Vp-p. When recording, the time code generated at the built-in time code generator/reader (TC-14 board) or time code input supplied from an external time code generator is fed out.
When playing back, the time code being displayed on the display is output.

⑮ DO SIG (dropout signal) OUTPUT connector

This is a dropout detector signal output (negative polarity TTL level) to an external dropout compensator (DOC). When an external TBC is connected to the TO TBC connector ⑲, this signal is fed out through the TBC. A pulse or RF output can be selected using the jumper plug on the EQ-02 board.

⑯ SPARE OUTPUT connector

Spare connector.

⑰ WFM (waveform) MONITOR OUTPUT connector

This is the video output connector for a waveform monitor; 1.0 Vp-p, 75 ohms.
The signal selected with the WAVEFORM MONITOR select buttons ⑫ on the level control panel is fed out.

⑱ VIDEO MONITOR OUTPUT connector

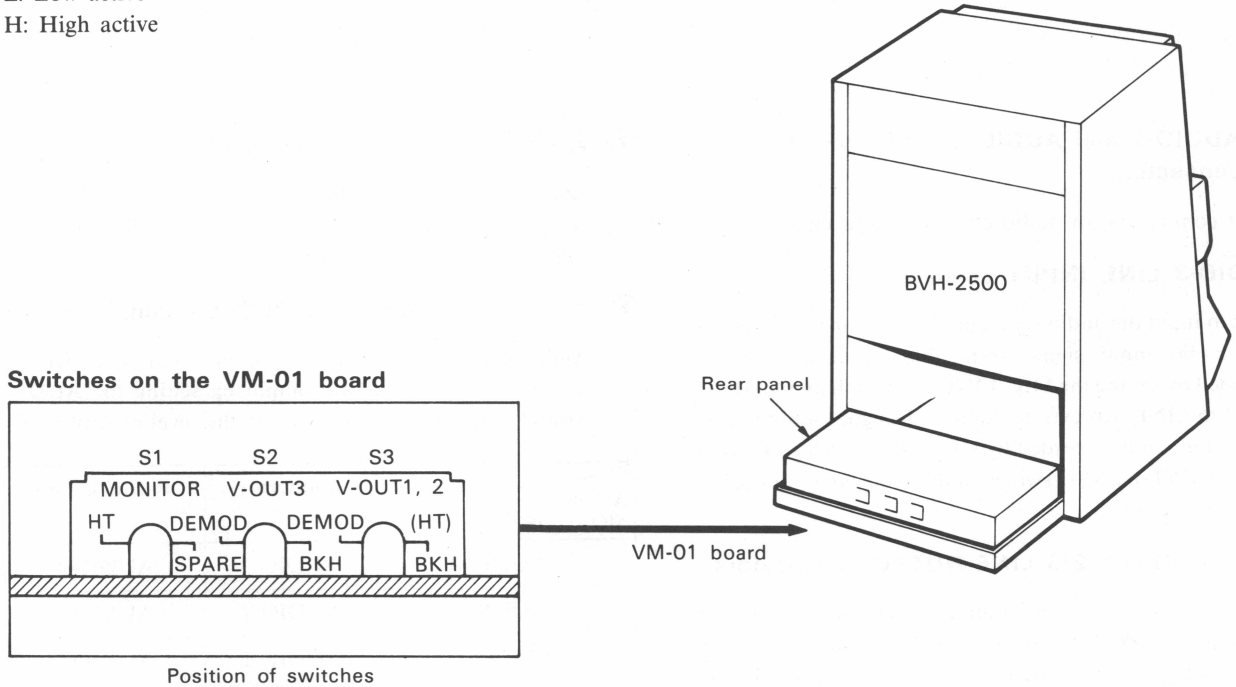
This is the video output connector for picture monitor; 1.0 Vp-p, 75 ohms (nominal).
The signal selected with the PICTURE MONITOR select buttons ⑤ on the level control panel is fed out.

⑲ TO TBC connector (18-pin connector)

Used when connecting the BVT-2000 using a multi cable. The Dynamic Tracking will not operate without this connection.

Pin No.	Signal	Signal level
A		
B	GND	
1	VIDEO OUT 50Ω	1Vp-p
2	VIDEO OUT (GND)	
3	DT V	TTL, high impedance
4	CT V (GND)	
5	OFF TAPE: H	TTL, high impedance
6	DO PULSE: L	TTL, high impedance
7	DO PULSE (GND)	
8	PLAY STATUS: H	TTL, high impedance
9		
10	FH	TTL, high impedance
11	FH (GND)	
12	CONFI: L	TTL, high impedance
13		
14	Ω CONNECT	TTL, high impedance
15	DT MODE: L	TTL, high impedance
16	FR PULSE: L	TTL, high impedance

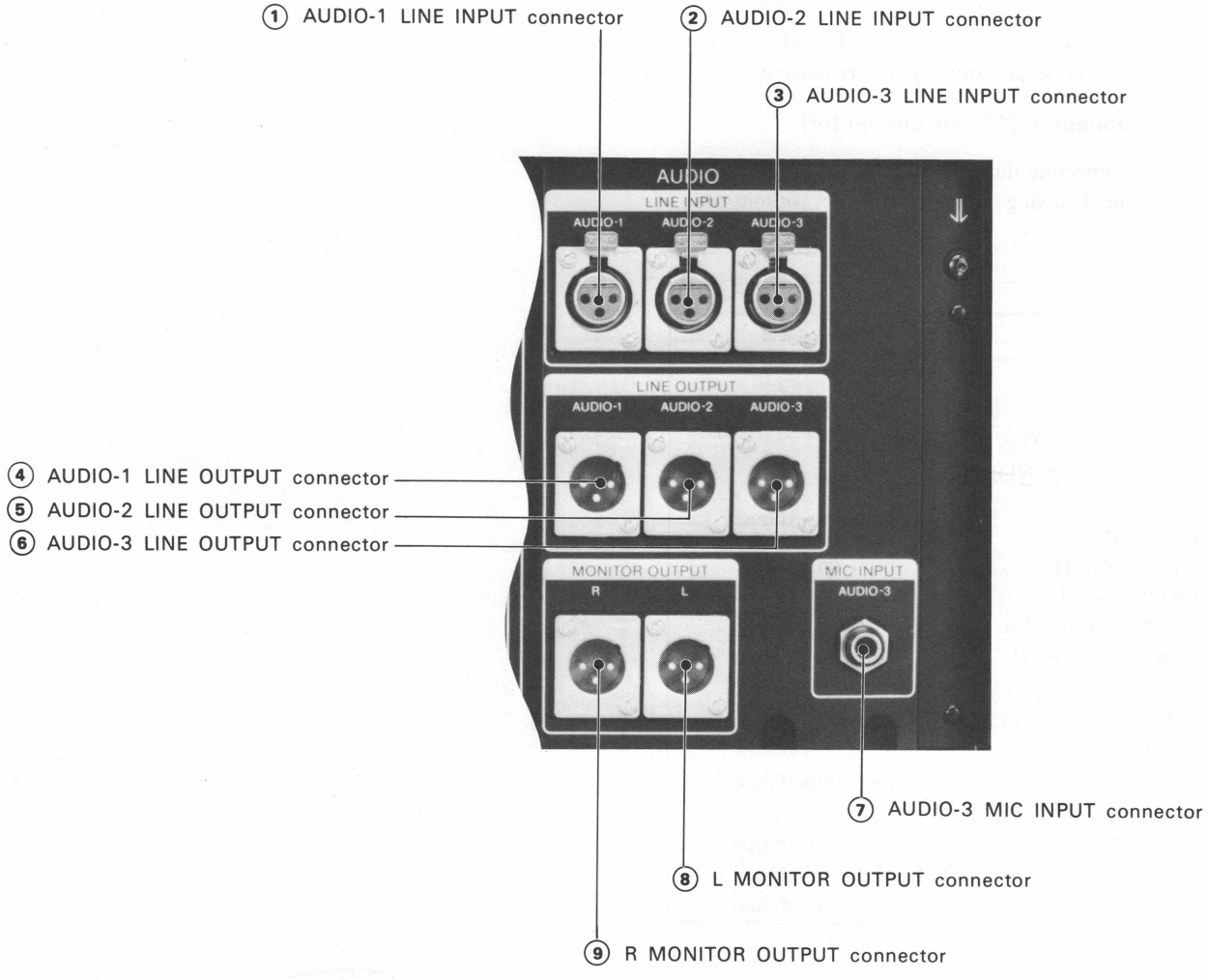
L: Low active
H: High active



Switches on the VM-01 board

Position of switches
S1: SPARE
S2: DEMOD
S3: DEMOD

Audio connector panel



① ② AUDIO-1 and AUDIO-2 LINE INPUT connectors

Input connectors for audio channel 1 and channel 2.

③ AUDIO-3 LINE INPUT connector

Used to input the audio signal or external time code signal. The audio input signal from this connector can be recorded by setting the MIC/LINE/TC switch on the AE-03 board to LINE. An external time code signal input to this connector can be recorded by setting the switch to TC and the INT/EXT-1/EXT-2 switch on the same board to EXT-2. (Refer to 1-6-3.)

④ ⑤ ⑥ AUDIO-1/2/3 LINE OUTPUT connectors

Audio channels 1, 2 and 3 output connectors. The output impedance is 600 ohms. It can be switched to 150 ohms or 37.5 ohms by shorting the conductive trace on the LA-02 board in the VTR. (Refer to section 2.)

⑦ AUDIO-3 MIC INPUT connector

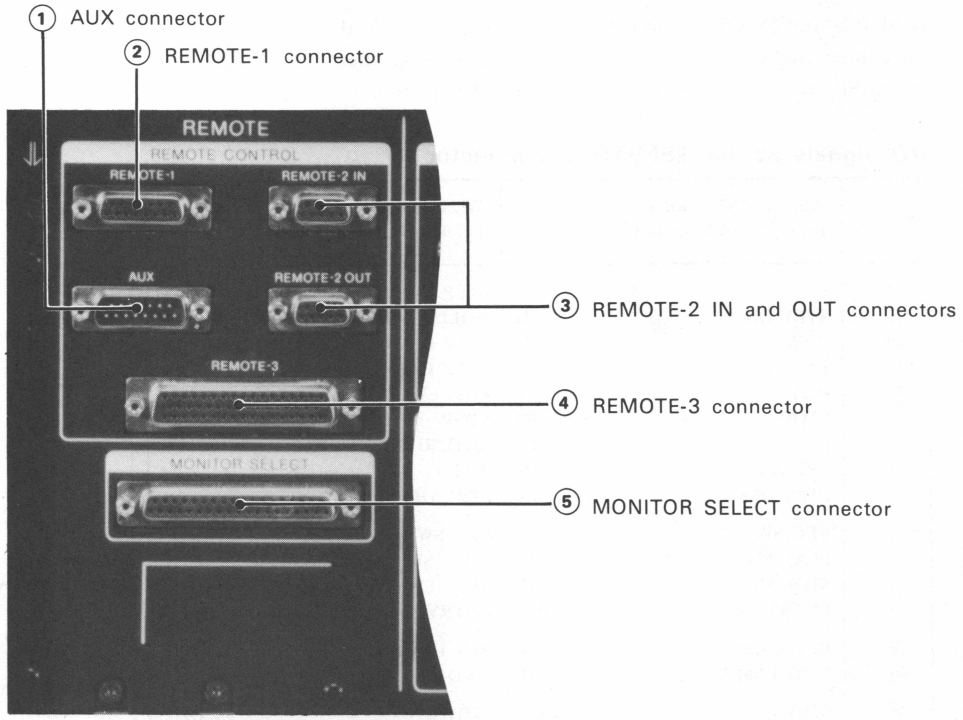
Audio channel 3 microphone input connector. The MIC input signal can be recorded by setting the MIC/LINE/TC switch on the AE-03 board to MIC.

⑧ ⑨ L and R MONITOR OUTPUT connectors

Audio channel 1 (L) and 2 (R) monitor output connectors. The following signals are output by setting the AUDIO MONITOR select buttons ⑥ on the level control panel.

Connector / AUDIO MONITOR button	L connector	R connector
AUDIO-1	AUDIO-1	AUDIO-1
AUDIO-2	AUDIO-2	AUDIO-2
AUDIO-1 AUDIO-2	AUDIO-1	AUDIO-2
AUDIO-3	AUDIO-3	AUDIO-3

Remote connector panel



① AUX (auxiliary) connector

Not used.

② REMOTE-1 connector

D-SUB 15-pin IN/OUT connector for remote control. A VTR or editing control unit with a CCJ (10-pin) REMOTE IN/OUT connector can be connected here using the BKH-2016 CCJ converter.

Connectable machines are as follows:

Editing control units: BVE-500, BVE-1000,
BVE-5000 (May be connected to the REMOTE-2 connector using the BK-5005 board instead of the BKH-2016.)

VTRs: BVH-1000, BVH-1100, BVH-1100A, BVH-1180

Remote control unit: BVR-1000

Dynamic motion controller: DTR-1100

Interface box: 1F-1000

③ REMOTE-2 IN and OUT connectors

D-SUB 9-pin IN/OUT connectors for remote control. Used for connecting VTR or editing control units with serial input/output remote control signals (RS-422) to the BVH-2500. Since the IN and OUT connectors are loop through, bridge connection of the remote control signals is possible.

Connectable machines are as follows:

Editing control units: BVE-800, BVE-3000, BVE-5000
(The BK-5005 board is necessary.)

VTRs: BVH-2000, BVU-800, BVU-820, BVH-2500

Dynamic control unit: DTR-2000

For details, refer to a separate manual, "PROTOCOL OF REMOTE-2 (9 PIN) CONNECTOR".

④ REMOTE-3 connector

D-SUB 50-pin IN/OUT connector for remote control. Used for connecting VTR or editing control units with parallel input/output remote control signals to the BVH-2500.

I/O signals at the REMOTE-3 connector

Pin No.	When the S2-8 switch on the LG-04 board is set to OFF		When the S2-8 switch on the LG-04 board is set to ON		
1	FF	IN	STEP FWD	IN	COMMAND INPUT (ACTIVE LOW)
19	STBY ON	IN	STILL PRESET	IN	
20	REW	IN	STEP REV	IN	
21	ENTRY	IN	STEP PRESET	IN	
34	PLAY	IN	PREVEW	IN	
35	STOP	IN	STOP	IN	
36	REC	IN	EDIT/REC	IN	
18	PREROLL	IN	AUTO	IN	
22	STBY OFF	IN	STBY OFF	IN	
2	REC SW	OUT	REC SW	OUT	COMMAND RETURN (ACTIVE LOW)
3	PLAY SW	OUT	PLAY SW	OUT	
4	STOP SW	OUT	STOP SW	OUT	
5	ENTRY SW	OUT	ENTRY SW	OUT	
37	REV LAMP	OUT	REV LAMP	OUT	SHUTTLE, JOG, VARIABLE (ACTIVE LOW)
40	FWD LAMP	OUT	FWD LAMP	OUT	
46	STBY ON	OUT	STBY ON	OUT	STATUS OUT (ACTIVE LOW)
47	PLAY	OUT	PLAY	OUT	
43	STOP	OUT	STOP	OUT	
24	REC	OUT	REC	OUT	
50	PREROLL	OUT	AUTO	OUT	
48	REMOTE	OUT	REMOTE	OUT	
49	ALARM	OUT	ALARM	OUT	
39	A1 PRESET	OUT	STEP FWD	OUT	
38	A2 PRESET	OUT	STEP REV	OUT	
42	A3 PRESET	OUT	STEP PRESET	OUT	
41	SYNC PRESET	OUT	STILL PRESET	OUT	
44	VIDEO PRESET	OUT	PREVEW	OUT	
26	ASSEMBLE PRESET	OUT	ASSEMBLE PRESET	OUT	
45	INSERT PRESET	OUT	Δt REC READY	OUT	
27	EDIT	OUT	EDIT/REC	OUT	
23	SYNC 6 LACK	OUT	SYNC 6 LACK	OUT	WARNING OUT (ACTIVE LOW)
25	VIDEO 6 LACK	OUT	VIDEO 6 LACK	OUT	
6	REF ERROR	OUT	REF ERROR	OUT	
7	CF LOCK	OUT	CF LOCK	OUT	
8	DRUM LOCK	OUT	DRUM LOCK	OUT	
9	CAP LOCK	OUT	CAP LOCK	OUT	
12	DVT		DVT		Interface to TC-14 board
13	DRD		DRD		
14	CK		CK		
15	DATA-1		DATA-1		
32	DATA-2		DATA-2		
16	DATA-4		DATA-4		
17	DATA-8		DATA-8		
28	DTM		DTM		
29	DGN		DGN		
30	MP		MP		
31	K4		K4		
33	GND		GND		
10	SP-2		SP-2		Not used
11	SP-1		SP-1		

Note: When the REMOTE-1/2/3 connectors are used, be sure to set the REMOTE switch on the SY-79 board to 1, 2 or 3, depending upon the connector being used.

⑤ MONITOR SELECT connector

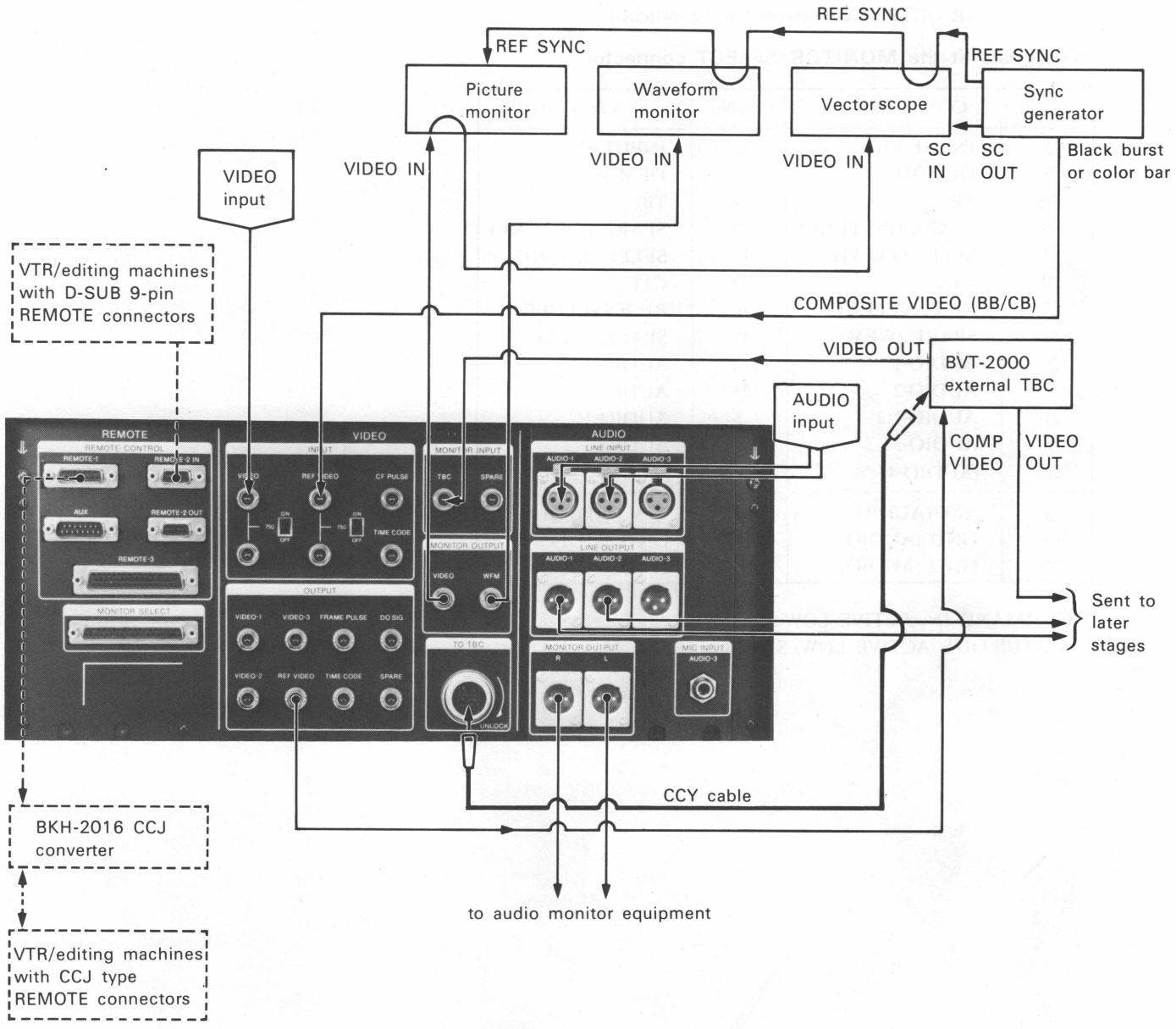
D-SUB 37-pin input connector for remote control of monitor switching. It is possible to connect the signal to this connector so that the output signal to the VIDEO MONITOR OUTPUT, WFM MONITOR OUTPUT and L/R MONITOR OUTPUT connectors can be switched.

I/O signals at the MONITOR SELECT connector

Pin No.	COMMAND IN	Pin No.	STATUS OUT
9	INPUT VID	13	INPUT VID
28	DEMOD	32	DEMOD
10	TBC	14	TBC
29	SPARE (PICTURE)	33	SPARE (PICTURE)
11	SELECTED VID	15	SELECTED VID
30	CTL	34	CTL
12	RF ENVELOPE	16	RF ENVELOPE
31	SPARE (WFM)	35	SPARE (WFM)
20	AUDIO-1	4	AUDIO-1
2	AUDIO-2	23	AUDIO-2
21	AUDIO-1/2	5	AUDIO-1/2
3	AUDIO-3	24	AUDIO-3
22	(AUDIO-4)	6	(AUDIO-4)
1	+5V (AUDIO)	8	+5V (VIDEO)
7	GND (AUDIO)	17	GND (VIDEO)
26	GND (AUDIO)	36	GND (VIDEO)

COMMAND IN: ACTIVE LOW
STATUS OUT: ACTIVE LOW, SINK CURRENT Max. 350 mA

1-5. CONNECTIONS

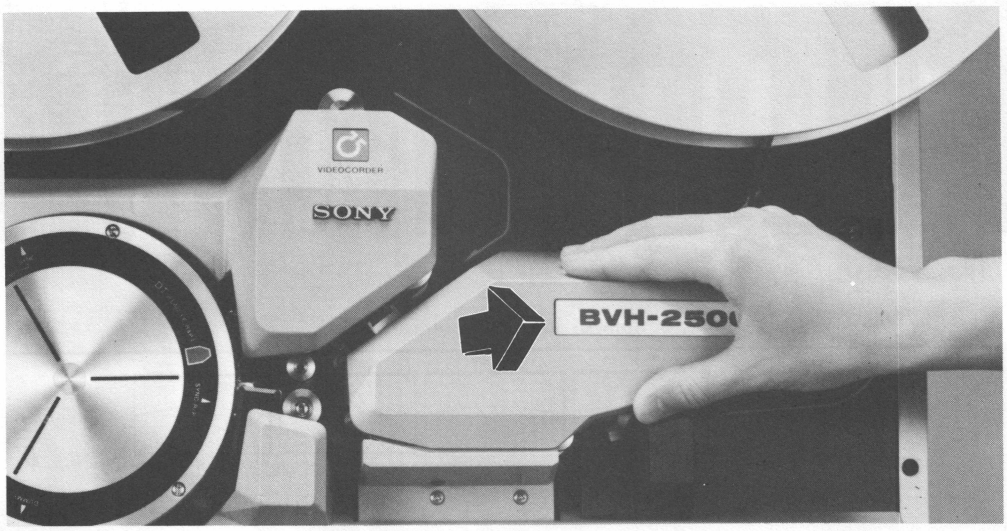


1-6. DESCRIPTION OF PARTS INSIDE THE UNIT

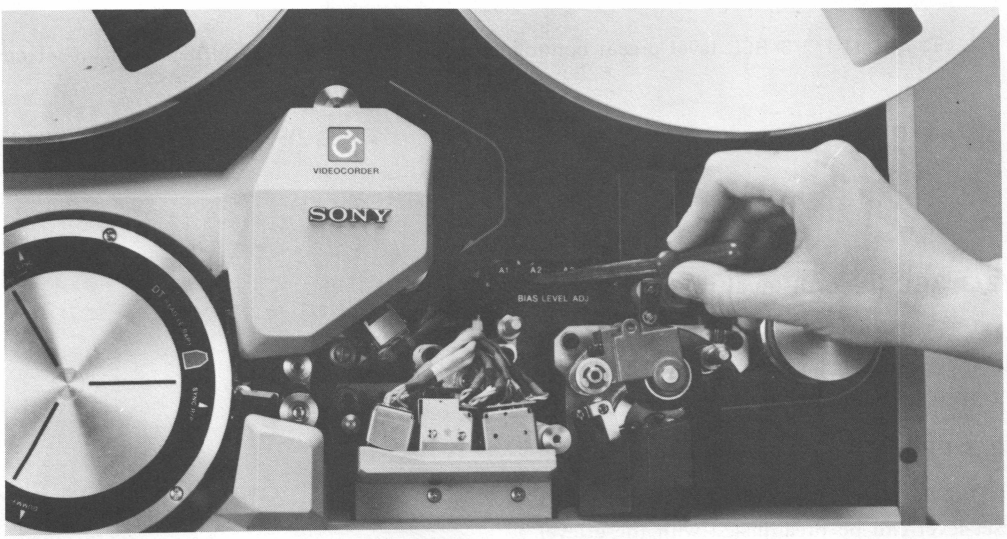
1-6-1. Record Bias Adjustment

The audio record bias current can be adjusted with the BIAS LEVEL ADJ controls to suit the characteristics of the tape used.

1. Pull and remove the head cover.

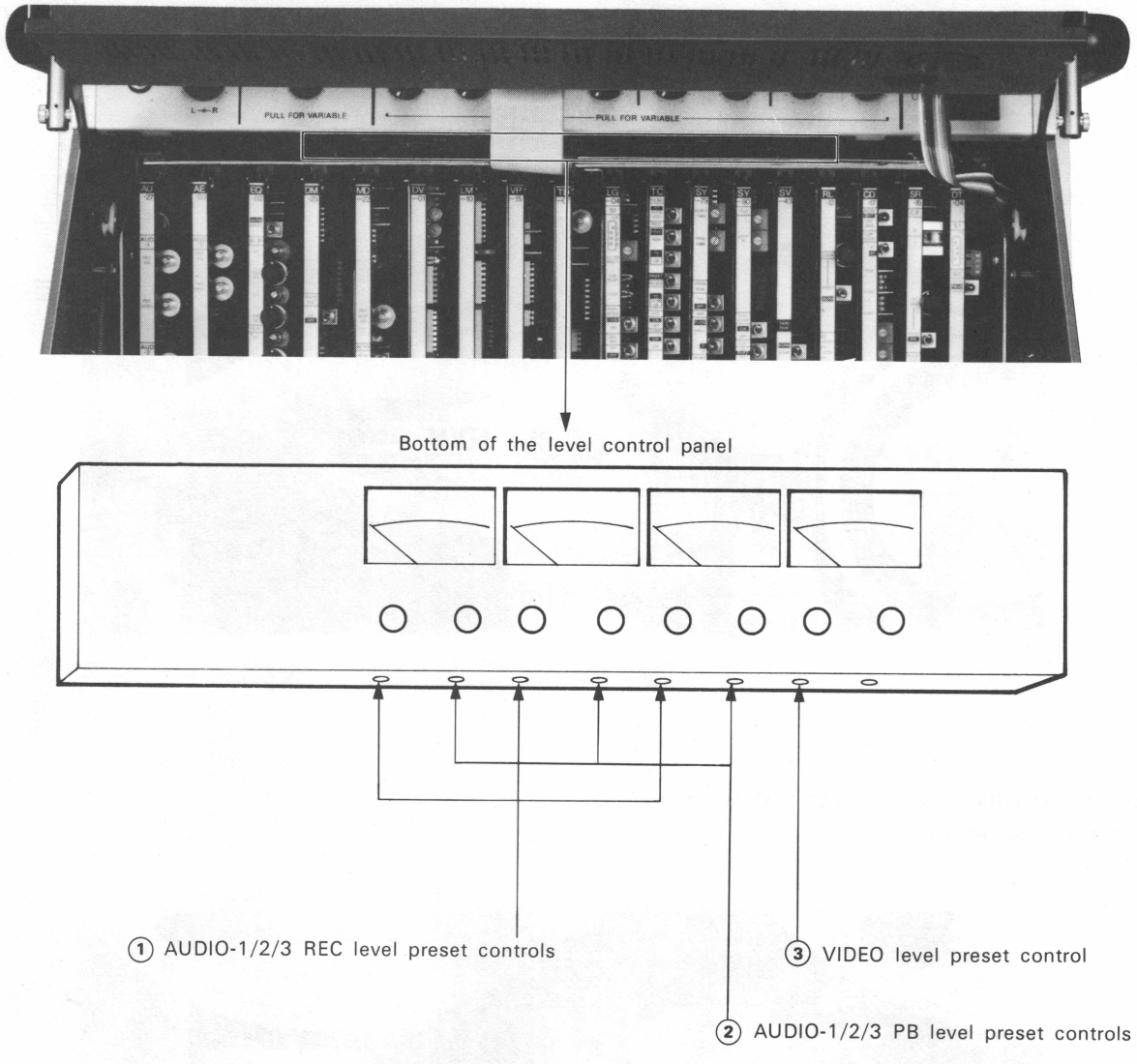


2. Adjust the AUDIO-1/2/3 BIAS LEVEL ADJ controls using an insulated screwdriver.



For details, refer to Section 2.

1-6-2. Recording and Playback Level Presetting



① AUDIO-1/2/3 REC (record) level preset controls

When the AUDIO REC level controls (1-4-1. ⑩) are pushed in, their preset level can be preadjusted with these level preset controls. For details, refer to Section 2.

② AUDIO-1/2/3 PB (playback) level preset controls

When the AUDIO PB level controls (1-4-1. ⑨) are pushed in, their preset level can be preadjusted with these level preset controls. For details, refer to Section 2.

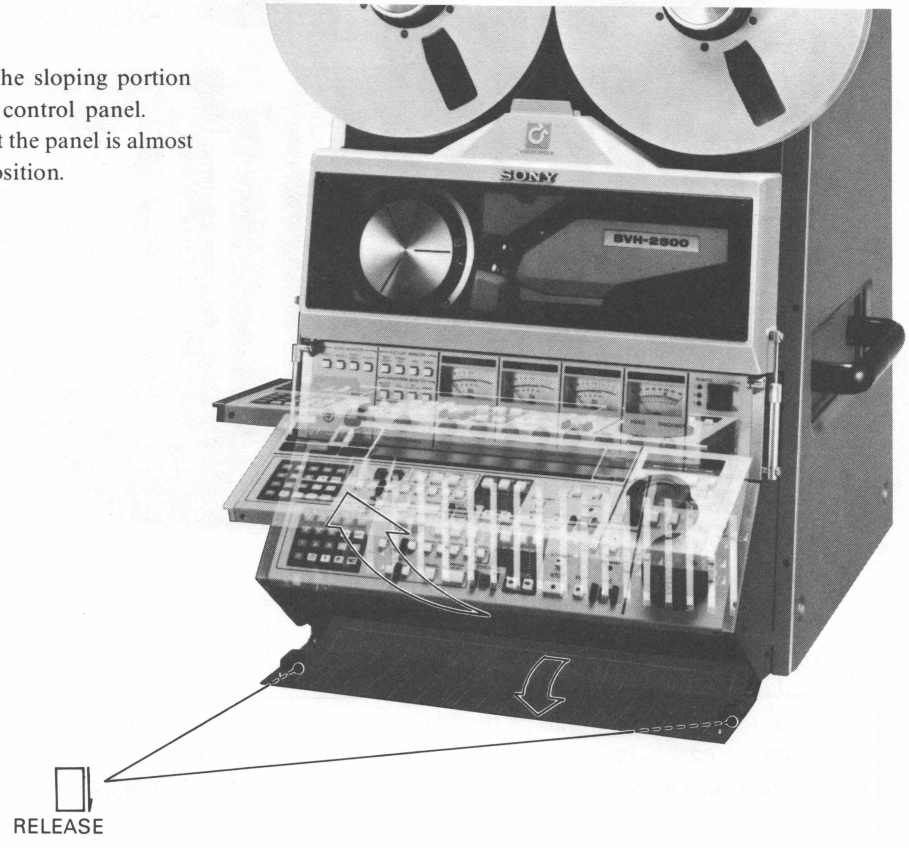
③ VIDEO level preset control

When the VIDEO level control (1-4-1. ⑧) is pushed in, its preset level can be preadjusted with this level preset control. For details, refet to Section 2.

1-6-3. Description of Controls on the Circuit Boards

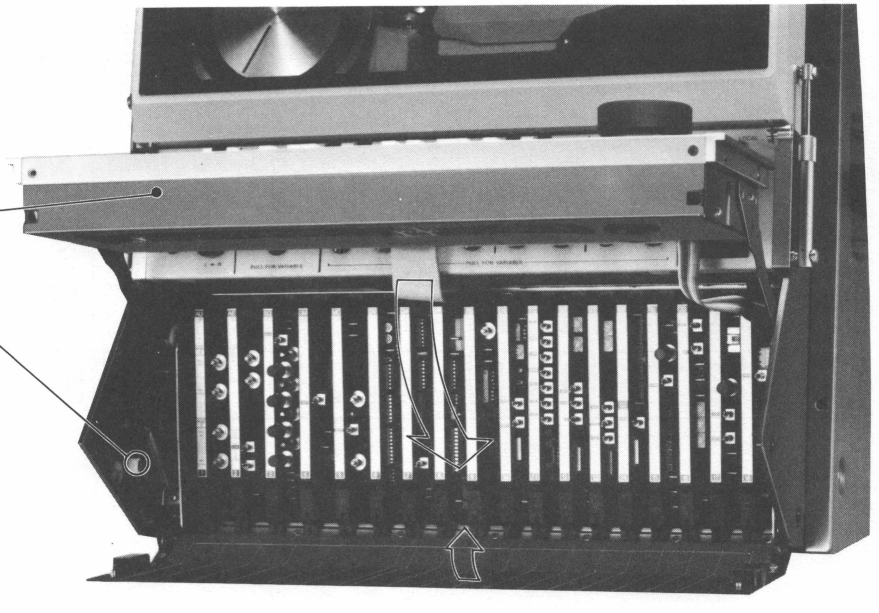
Opening

1. Depress the right and left bosses on the sloping portion under the front surface to release the control panel.
2. Lift up the function control panel so that the panel is almost horizontal. The panel locks in this position.

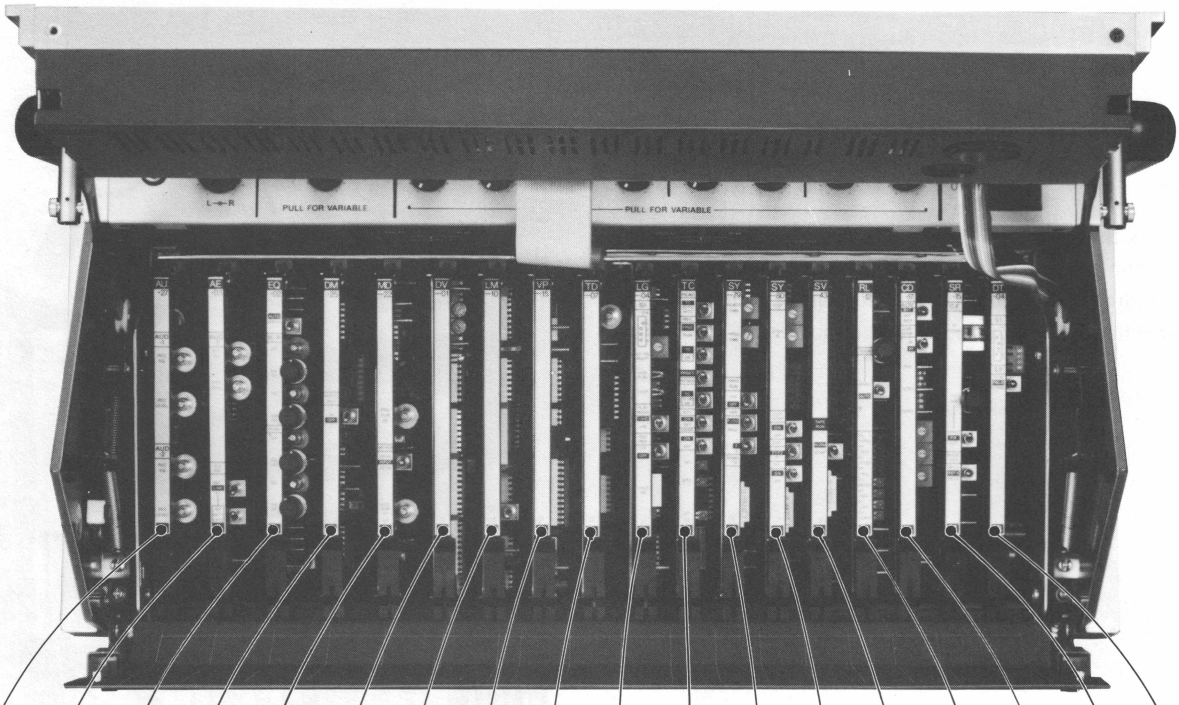


Closing

While holding the panel so that it does not drop suddenly, depress the white button to release the lock, and close the panel.



Board extraction and insertion



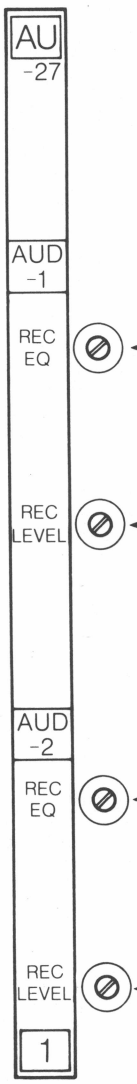
AU -27 Board	AE -03 Board	EQ -02 Board	DM -25 Board	MD -22 Board	DV -01 Board	LM -10 Board	VP -15 Board	TD -07 Board	LG -04 Board	TC -14 Board	SY -79 Board	SY -80 Board	SV -43 Board	RL -12 Board	CD -17 Board	SR -15 Board	DT -04 Board
(AUDIO 1/2)	(AUDIO 3)	(EQUALIZER)	(DEMODULATOR)	(MODULATOR)	(DELTA VIDEO)	(LINE MEMORY)	(VIDEO PROCESSOR)	(TRACK DRIVE)	(LOGIC)	(TIME CODE)	(SYSTEM-CPU 1)	(SYSTEM-CPU 2)	(SERVO-CPU)	(REEL SERVO)	(CAPSTAN AND DRUM)	(SERVO REFERENCE)	(DYNAMIC TRACKING)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

If it should be necessary to remove circuit boards, follow these precautions.

- Be sure that the power is off.
- Put in the board so that the printed circuit board number agrees with the designated number on the bottom of the VTR. Numbers [1] to [18] are in numerical order from left to right.

If the power is turned on with a board in a wrong position, damage to the board may result.

AU-27 board [1] (AUDIO-1/2)



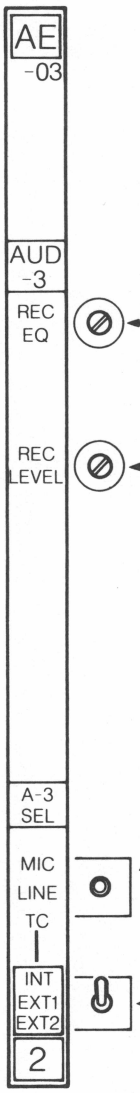
AUD-1 REC EQ (audio-1 record equalizer) control (RV108)
Used to adjust the overall equalizer characteristics of audio channel 1 when recording and playing back on this unit. Adjust with a screwdriver.

AUD-1 REC (audio-1 record) LEVEL control (RV109)
Input a standard signal and set the VTR to the E-to-E mode. Set the meter reading to the predetermined level using the REC level control on the level control panel. Then set the VTR to the REC mode and the TAPE/EE selector to TAPE. Adjust the output level of the MONITOR OUTPUT connectors (on the audio connector panel) to the predetermined level with this control using a screwdriver.

AUD-2 REC EQ (audio-2 record equalizer) control (RV208)
Adjust in the same way as the AUD-1 REC EQ control.

AUD-2 REC (audio-2 record) LEVEL control (RV209)
Adjust in the same way as the AUD-1 REC LEVEL control.

AE-03 board [2] (AUDIO-3)



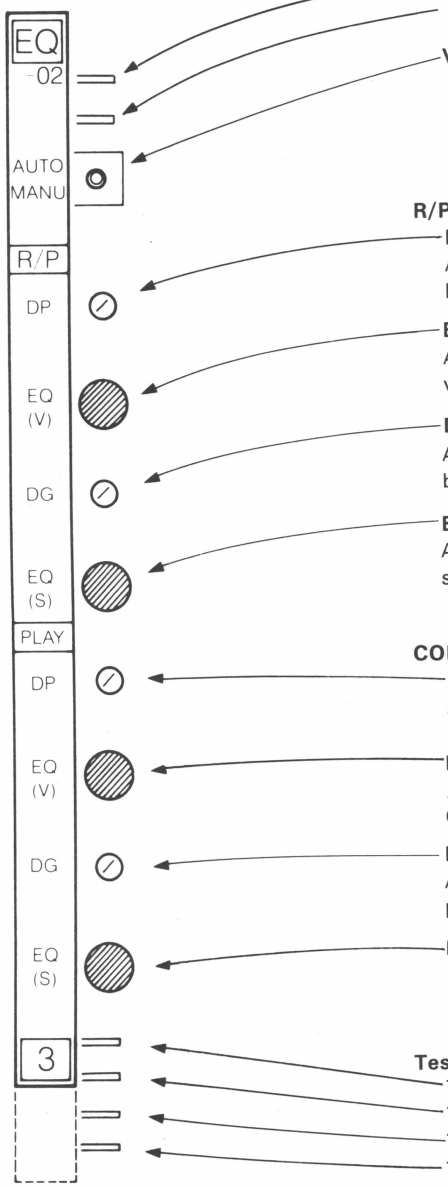
AUD-3 REC EQ (audio-3 record equalizer) control (RV28)
Adjust in the same way as the AUD-1 REC EQ control.

AUD-3 REC (audio-3 record) LEVEL control (RV29)
Adjust in the same way as the AUD-1 REC LEVEL control.

A-3 SEL (audio-3 input selector) switch (S1)
Switches according to the input signal to the AUDIO-3 INPUT connector.
MIC: Input to the AUDIO-3 MIC INPUT connector on the connector panel.
LINE: Input to the AUDIO-3 LINE INPUT connector on the connector panel.
TC: When recording the time code on audio channel 3.

Time code input selector switch (S2)
When the A-3 SEL input selector is set to TC, switch according to the input time code.
INT: When the internal time code generator/reader (TC-14 board [11]) is used.
EXT 1: When using the input time code to the TIME CODE INPUT connector (BNC) on the connector panel.
EXT 2: When using the input time code to the AUDIO-3 LINE INPUT connector (XLR) on the connector panel.

EQ-02 board [3] (EQUALIZER)



Test point (for waveform monitoring)
TP1: RF output waveform of the R/P video head
TP2: RF output waveform of the R/P sync head

Video equalizer AUTO/MANU (manual) switch (S1)
Switches between the automatic and manual adjustment of the chroma level of the playback video signal.
AUTO: Automatically adjusted to the chroma level preset by the switches on this board.
MANU: Manually adjusted by the controls described below.

R/P head system

DP control (RV1)
Adjusts the DP characteristic of the video signal played back by the R/P video head.

EQ (V) control (RV2)
Adjusts the equalizer level of the playback signal of the R/P video head.

DG control (RV3)
Adjusts the DG characteristic of the video signal played back by the R/P video head.

EQ (S) control (RV4)
Adjusts the equalizer level of the playback signal of the R/P sync head.

CONFI (PLAY) head system

DP control (RV5)
Adjusts the DP characteristic of the video signal played back by the CONFI (PLAY) video head.

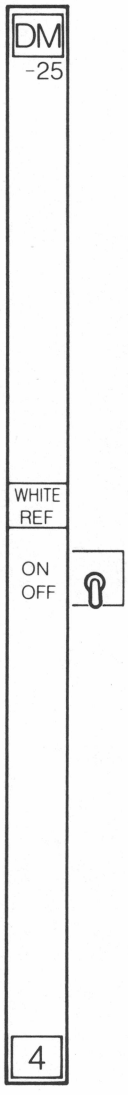
EQ (V) control (RV6)
Adjusts the equalizer level of the playback signal of the CONFI (PLAY) video head.

DG control (RV7)
Adjusts the DG characteristic of the video signal played back by the CONFI (PLAY) video head.

EQ (S) control (RV8)
Adjusts the equalizer level of the playback signal of the CONFI (PLAY) sync head.

Test point (for waveform monitoring)
TP3: RF output waveform of the CONFI (PLAY) video head.
TP4: RF output waveform of the CONFI (PLAY) sync head.
TP5: RF waveform after VIDEO and SYNC switching
TPE-5: Ground

DM-25 board [4] (DEMODULATOR)

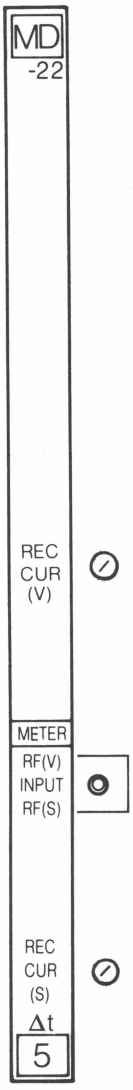


WHITE REF (reference) switch (SW1)

ON: The white reference signal is added to the demodulator output signal. Deviation level can be adjusted by setting the white peak level of the input video signal to the white reference signal level.

OFF: Normally set the switch to this position. The white reference signal is not added.

MD-22 board [5] (MODULATOR)

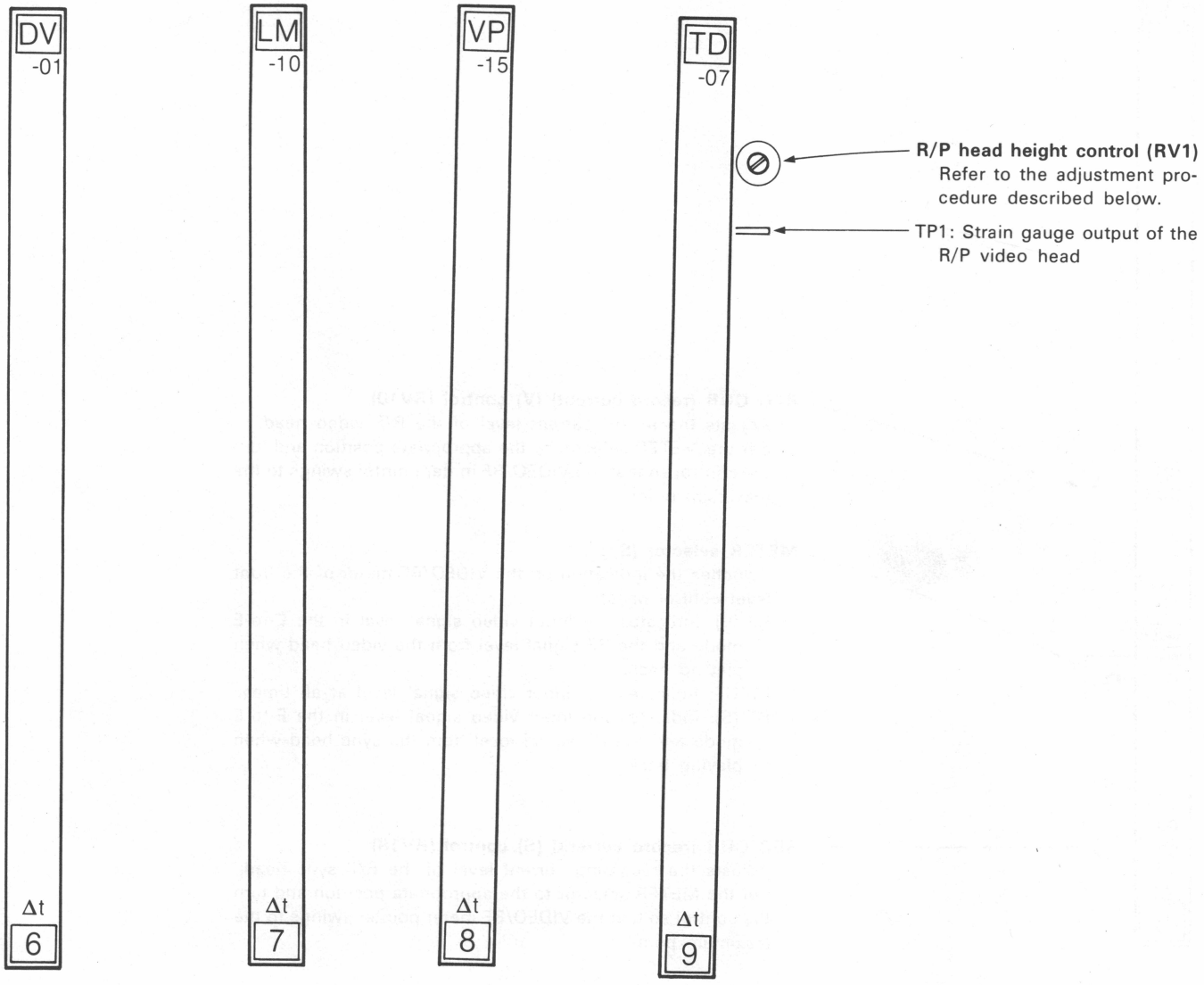


REC CUR (record current) (V) control (RV10)
Adjusts the record current level of the R/P video head. Set the METER selector to the appropriate position and turn the control so that the VIDEO/RF meter pointer swings to the maximum point.

METER selector (S1)
Switches the indication on the VIDEO/RF meter of the front level control panel.
RF (V): Indicates the input video signal level in the E-to-E mode and the RF signal level from the video head when playing back.
INPUT: Indicates the input video signal level at all times.
RF (S): Indicates the input video signal level in the E-to-E mode and the RF signal level from the sync head when playing back.

REC CUR (record current) (S) control (RV18)
Adjusts the recording current level of the R/P sync head. Set the METER selector to the appropriate position and turn the control so that the VIDEO/RF meter pointer swings to the maximum point.

DV-01 board [6] (DELTA VIDEO)
LM-10 board [7] (LINE MEMORY)
VP-15 board [8] (VIDEO PROCESSOR)
TD-07 board [9] (TRACK DRIVE)

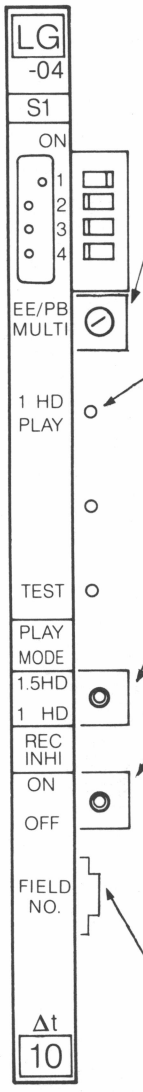


R/P head height adjustment

Before making a recording, adjust the height of the R/P video head as follows:

1. Thread the tape, and set the following switch and select button on the control panel as follows:
   TAPE/EE selector → TAPE
   WAVEFORM MONITOR select button → RF ENVELOPE
2. Connect a waveform monitor or an oscilloscope to the WFM MONITOR OUTPUT connector. Set the VTR in the REC mode and turn the R/P head height control (RV1) on the TD-07 board so that the following levels are obtained:
   RF output signal level (at the WFM MONITOR OUTPUT connector): at the maximum
   Strain gauge output level (at the TP1 test point shown above): 0 ± 100 mV

LG-04 board 10 (LOGIC)



EE/PB MULTI switch (S8)

Sets the ratio of E-to-E mode picture to playback picture with respect to 32 fields in the PREVIEW mode of Δt recording.

Switch position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Ratio of E-to-E picture to playback picture	1/32	1/32	2/32	3/32	4/32	5/32	6/32	7/32	8/32							

Lights during 1-HEAD playback. (D9)

PLAY MODE switch (S3)

1.5 HEAD: Can record and play back the VIDEO/SYNC.
1 HEAD: Can record the VIDEO/SYNC but cannot play back the SYNC.

REC INHI (record inhibit) switch (S4)

Inhibits the REC and EDIT REC modes.
ON: The VTR will not go into the record mode even if the REC button or EDIT/REC button on the control panel are pressed. When the VTR is remotely controlled, the record command is not accepted.
OFF: The REC or EDIT/REC button can be used normally.

Note: In accordance with the setting of the switches on the front panel and LG-04 board, the REC INHIBIT state is as shown in the table below.

REC INHIBIT switch		REC INHIBIT state
Front panel	LG-04 board	
ON	ON	ON
ON	OFF	ON
OFF	ON	ON
OFF	OFF	OFF

When the REC INHIBIT switch on the front panel is primarily put to use, set the switch on the LG-04 board to OFF, or remove it.

FIELD No. display (ND1)

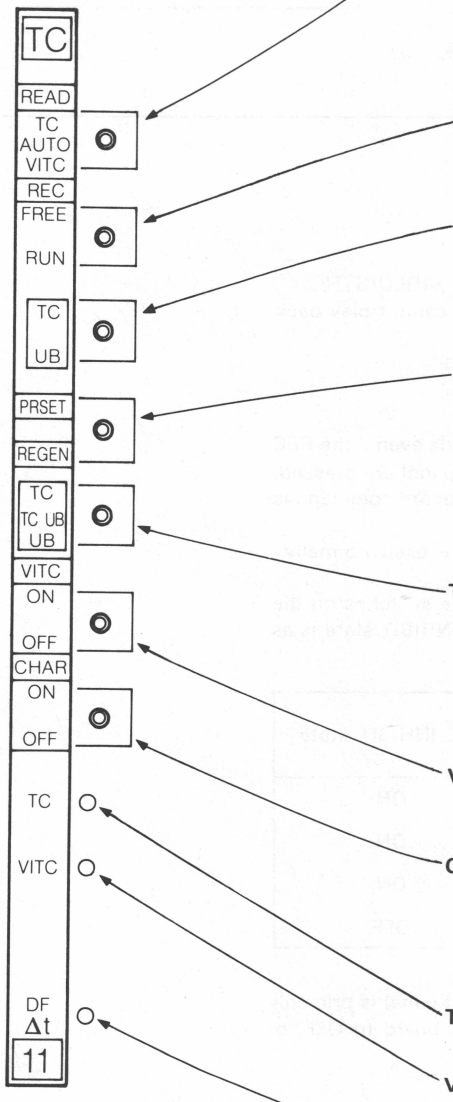
The field number is displayed when color fields are being read in Δt mode.

Display	Field No.
1	Field 1
2	Field 2
3	Field 3
4	Field 4

TC-14 board [11] (TIME CODE)

For information about the DIP switches on the TC-14 board, refer to 1-6-4.

- For the machine with the serial number 10401 and higher, please refer to the manual furnished with the BKH-2015A.



READ switch (S1)
TC: Reads the SMPTE time code. During Δt recording, be sure to use this position.
AUTO: Reads the VITC when the tape speed is less than 1/2 normal and the SMPTE time code when the speed is more than 1/2 normal.
VITC: Reads the VITC.

Time code generator mode selector (S2)
FREE: The generator works at all times.
RUN: The generator works only when the VTR is set to the record mode.

TC (time code)/UB (user bit) switch (S3)
Operates as follows when the PRSET/REGEN switch (described below) is set to PRSET.
TC: Can preset and display the time code.
UB: Can preset and display the user bit.

PRSET (preset)/REGEN (regenerate) switch (S4)
Works with the time code/user bit switches above and below this switch.
PRSET: Can preset and display the time code or user bit using the numerical keys of the 20-key section.
REGEN: The VTR goes into the time code or user bit regenerate mode. The generator is locked to the time code read by the reader.

Time code/user bit switch (S5)
Works as follows when the above PRSET/REGEN switch is set to REGEN.
TC: Only the time code goes into the REGEN mode.
TC + UB: The time code and user bit go into the REGEN mode.
UB: Only the user bit goes into the REGEN mode.

VITC ON/OFF switch (S6)
ON: Recording of the VITC is possible.
OFF: Recording of the VITC is not possible.

CHAR (character) ON/OFF switch (S7)
ON: The character signal can be superimposed on the signal output from the VIDEO MONITOR OUTPUT connector.
OFF: The character signal is not superimposed on the signal output from the VIDEO MONITOR OUTPUT connector.

TC LED (green) (ND1)
Lights when the SMPTE time code is read correctly.

VITC LED (green) (ND2)
Lights when the VITC is read correctly.

DF (drop frame) LED (green) (ND3)
Lights when the TC-14 board is in the DF mode.

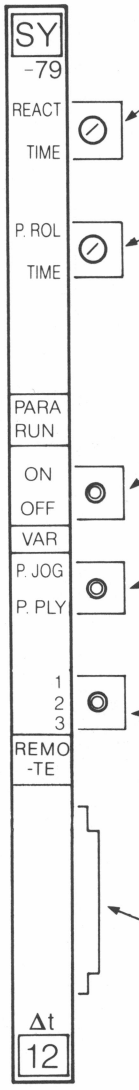
Note on video dubbing and VITC

Be sure to set the VITC insert position switches (SW9 and SW10) to the correct position when replacing the VITC previously inserted into the video input signal on the record VTR. When new VITC data are to be inserted in different lines from those of the video input signal, all VITC data which have already been inserted in the video input signal should be blanked on the TBC before inserting the new VITC.
When dubbing the playback signal as it is without replacing the VITC already inserted in it, be sure to check the position of the TBC V-BLANKING ON/OFF switch for the player VTR so that the VITC is not blanked. Set the VITC ON/OFF switch on the TC-14 board of the recorder VTR to OFF.

Note on the audio monitor head and time code

The LTC on audio channel 3 played back with the audio monitor head is different in its phase from the VITC and reference sync, so pay attention to this fact when the record confidence signal from this VTR is to be recorded on another VTR.

SY-79 board 12 (SYSTEM-CPU 1)



REACT (reaction) TIME switch (S1)

Sets the reaction time to compensate for the delay due to manual button operation. When the ENTRY IN and ENTRY OUT buttons, etc, are pressed, the data displayed on the display is decreased by the value set by this switch and the result is memorized as the edit point. Frames from 0 to 30 can be set in two-frame units. (16-position rotary switch)

P.ROL (preroll) TIME switch (S2)

Sets the preroll time when cueing the edit point, which can be set in one-second units from 0 to 15 seconds. (16-position rotary switch)

PARA (parallel) RUN switch (S4)

Can make two VTRs work synchronously.

ON: When the CONTROL P and CONTROL R buttons on the control panel are pressed, the lamps of both buttons light. If any buttons on the control panel are pressed, both VTRs work in the mode of the pressed buttons.

OFF: Normally set the switch at this position. Either the CONTROL P or CONTROL R lamp lights. Either the player or recorder works corresponding to the P or R lamp which lights. Also set to this position when only this VTR is operated independently.

VAR (variable) switch (S5)

Switches the VAR button functions on the control panel.

P.JOG: PROGRAM JOG function
(Variable speed playback at −1 to +3 times normal)

P. PLY: PROGRAM PLAY function
(Variable speed playback at −20% to +20% normal)

REMOTE switch (S6)

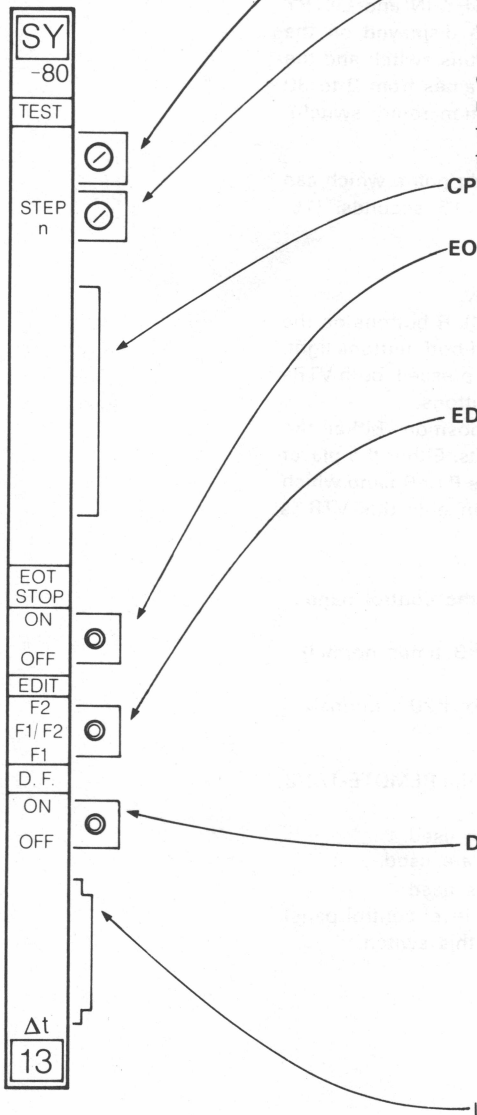
Switches according to the connections of the REMOTE-1/2/3 connectors on the connector panel.

1: When the REMOTE-1 connector is used.
2: When the REMOTE-2 connectors are used.
3: When the REMOTE-3 connector is used.

One of the REMOTE-1/2/3 lamps on the level control panel lights corresponding to the position of this switch.

LED for servicing

SY-80 board 13 (SYSTEM-CPU 2)



TEST switch (S1)
16-position rotary switch for calling data (for servicing).

STEP n switch (S2)
Sets the number of times the STEP recording is to be automatically repeated each time the EDIT/REC button is pressed. At "0" position, the STEP recording is performed once, and at a position from "1" to "F", the STEP recording is repeated the number of times corresponding to the figure of the switch position. The letters "A" through "F" correspond to the numbers "10" through "15".

CPU reset switch
Push-switch for servicing

EOT (end of tape) STOP switch (S5)
Selects whether the VTR is automatically stopped or not at the beginning and end of the tape.
ON: The VTR automatically stops at the beginning and end of the tape.*
OFF: The tape is rewound to the other reel completely.

EDIT switch (S6)
Sets the edit timing of the video and the frame unit when the unit of Δt recording is set to frame (FRM).
F2: During editing, IN point is set at field 2, and OUT point at field 1.
During Δt recording, the frame unit is set at either field 2 and field 3, or field 4 and field 1.
F1/F2: During editing, any field specified with the ENTRY IN and OUT buttons is set as the IN point and OUT point.
During Δt recording, the frame unit is the same as when this switch is set to "F1".
F1: During editing, the IN point is set at field 1, and the OUT point at field 2.
During Δt recording, the frame unit is field 1 and field 2, or field 3 and field 4.

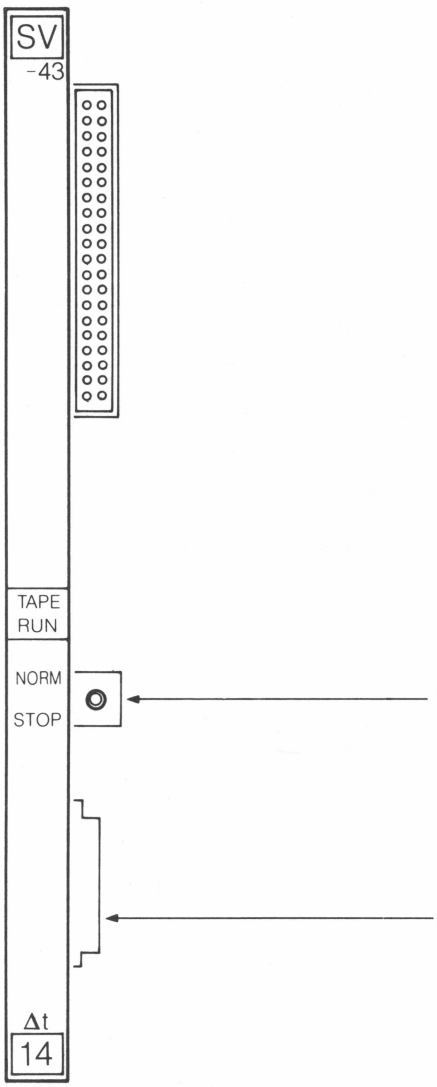
D.F. (drop frame) ON/OFF switch (S7)
ON: The timer and time code go into the drop frame mode.
OFF: The timer and time code go into the non-drop frame mode.

Display
0:00:00:00
The cursor appears in the drop frame mode.
The cursor appears when the DF flag on the time code is ON.

LED for servicing

* If the PLAY MODE EOT INHIBIT switch (S2-3) on the LG-04 board is set to ON, the automatic stop function is not activated in the PLAY or RECORD mode and the tape on the supply-reel is completely wound up even if this switch is set to ON.

SV-43 board 14 (SERVO-CPU)



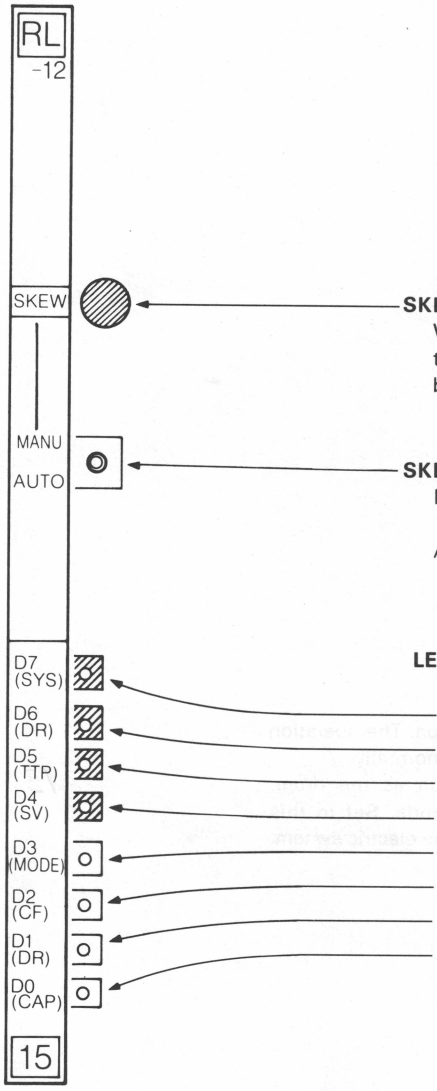
TAPE RUN switch (S2)

NORM: Normally set the switch at this position. The operation buttons on the control panel all work normally.

STOP: The drive mechanism systems, such as the drum, capstan, reel, etc., go into the STOP mode. Set to this position when checking the operation of the electric system.

LED for servicing

RL-12 board 15 (REEL SERVO)



SKEW control (RV14)

When the SKEW switch (described below) is set to MANU, the time lag due to video head switching during playback can be compensated using this control knob.

SKEW switch (S1)

MANU: For manual adjustment. The SKEW control (described above) can be used.

AUTO: For automatic adjustment. The SKEW adjustment circuit operates during playback, and the time lag due to the change-over of the video heads is compensated automatically.

LEDs for checking errors (eight)

Normally, the LEDs light indicating the following conditions:

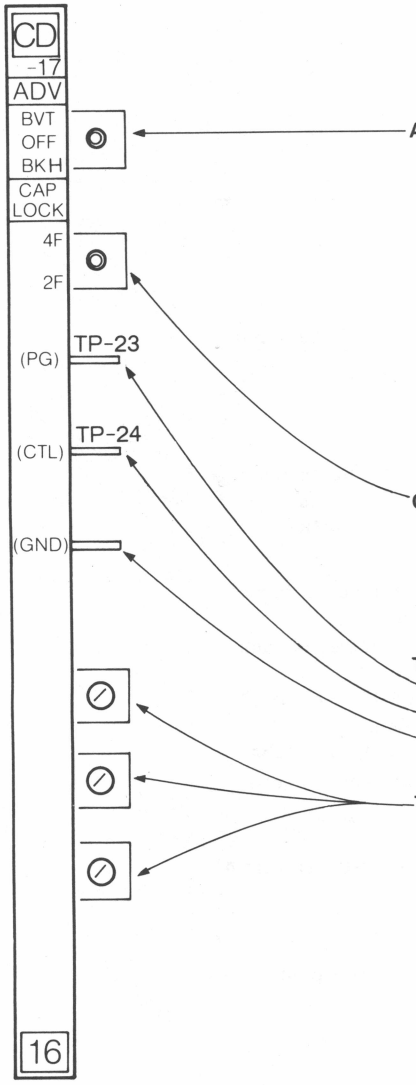
- D7 (SYS): SYSCON INTERFACE ERROR
- D6 (DR): DRUM ERROR
- D5 (TTP): TAPE TRANSPORT ERROR
- D4 (SV): SYSTEM ERROR

} Red (abnormal)

- D3 (MODE): MODE READY
- D2 (CF): REF COLOR FRAME DET
- D1 (DR): DRUM LOCK
- D0 (CAP): CAPSTAN LOCK

} Green (normal)

CD-17 board 16 (CAPSTAN and DRUM)



ADV (advance) switch (S1)
Sets the advanced value of the sync signal required for playback.
BVT: When the BVT-2000 (external TBC) is used, the advanced value is set using the 16-position rotary switch on this board. Set the rotary switch to 8H.
OFF: The reference sync signal synchronizes with the playback signal.
BKH: The drum phase advances by 1.5H with respect to the reference sync signal.

CAP (capstan) LOCK switch* (S2)
Determines the capstan servo lock phase with respect to the reference sync signal during playback.
4F: Locked to the color frame mode (4 field)
2F: Locked by the frame unit (2 field)

Test point (for waveform monitoring)
PG: Output of the drum PG signal
CTL: Output of the CTL signal
GND: Ground

Test mode switches (S4, S5, S6)
Three 16-position rotary switches for test use.

* **For the machine with the serial number 10400 and lower:**

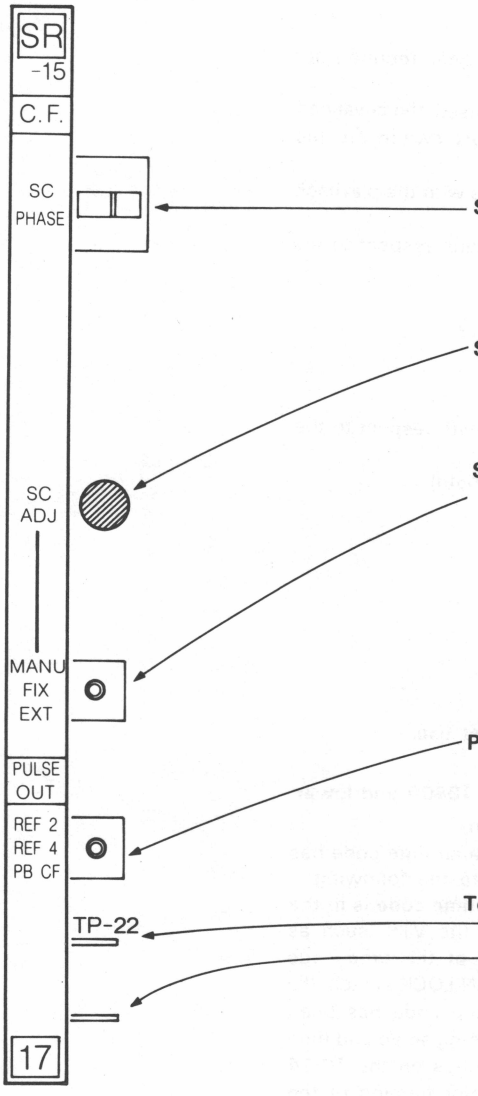
Color framing and time code generation

When a video tape on which non-color frame time code has been recorded is to be played back, note the following:
When the VTR is in the record mode, the time code is in the color framing mode. In other modes of the VTR, such as playback and editing modes, the mode of the time code depends upon the position of the CAPSTAN LOCK switch. If a video tape on which non-color frame time code has been recorded is played back with the color framing servo and time code is regenerated (by setting the switches on the TC-14 board to an appropriate position) the color framing of the regenerated time code will conflict with that of the tape being played back. As a result, the time code outputs (from the BNC and XLR connectors) are not renewed (regeneration of time code stops). To play back the tape with such time code data, set the CAPSTAN LOCK switch to "2F". During editing, check that the CAPSTAN LOCK switch on the recorder VTR is set at the same position as that of the playback VTR.
Note that when a tape is played back on the BVH-2500 without servo reference, the VITC recorded on the tape may not be read.
During editing, the CAPSTAN LOCK switch on the recorder VTR must be set to either of the following:

- For insert or assemble editing with continuous time code data recording, set the switch to 2F.
- For continuous color framing marker of CTL every 2 frames, set to 4F.

For the machine with the serial number 10401 and higher, please refer to the manual furnished with the BKH-2015A.

SR-15 board 17 (SERVO REFERENCE)



SC PHASE meter (M1)
Indicates the subcarrier phase with respect to the input reference signal sync.

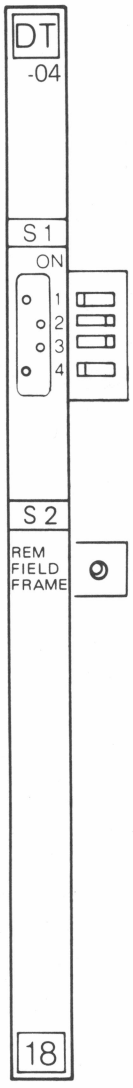
SC ADJ (adjust) control (RV5)
Stabilizes the detection operation of the color frame pulse from the input reference signal. This control operates when the SC ADJ switch described below is set to MANU.

SC ADJ (adjust) switch (S1)
MANU: Used to adjust the detected phase of the color frame pulse. Use with the above control (RV5).
FIX: Normally set the switch at this position. Detects the color frame pulse as an absolute phase.
EXT: The color frame pulse fed from the CF PULSE INPUT connector on the connector panel is used.
- Be sure to check that the D2 LED (REF COLOR FRAME DET) on the RL-12 board lights when this switch is set at any position.

PULSE OUT switch (S2)
Switches the output signal of the FRAME PULSE OUTPUT connector on the connector panel.
REF 2: Outputs the 2-field pulse.
REF 4: Outputs the 4-field pulse.
PB CF: Outputs the frame pulse of the playback signal.

Test point
REF.F: Reference frame pulse output
G: Ground

DT-04 board 18 (DYNAMIC TRACKING)



Dynamic tracking playback switch (S2)

REM: The field jog or frame jog mode can be selected with the R/P MODE selector on the function control panel. When the VTR is in the remote mode, the field jog or frame jog mode can be selected from the external equipment connected to this VTR.

FIELD: Field jog mode

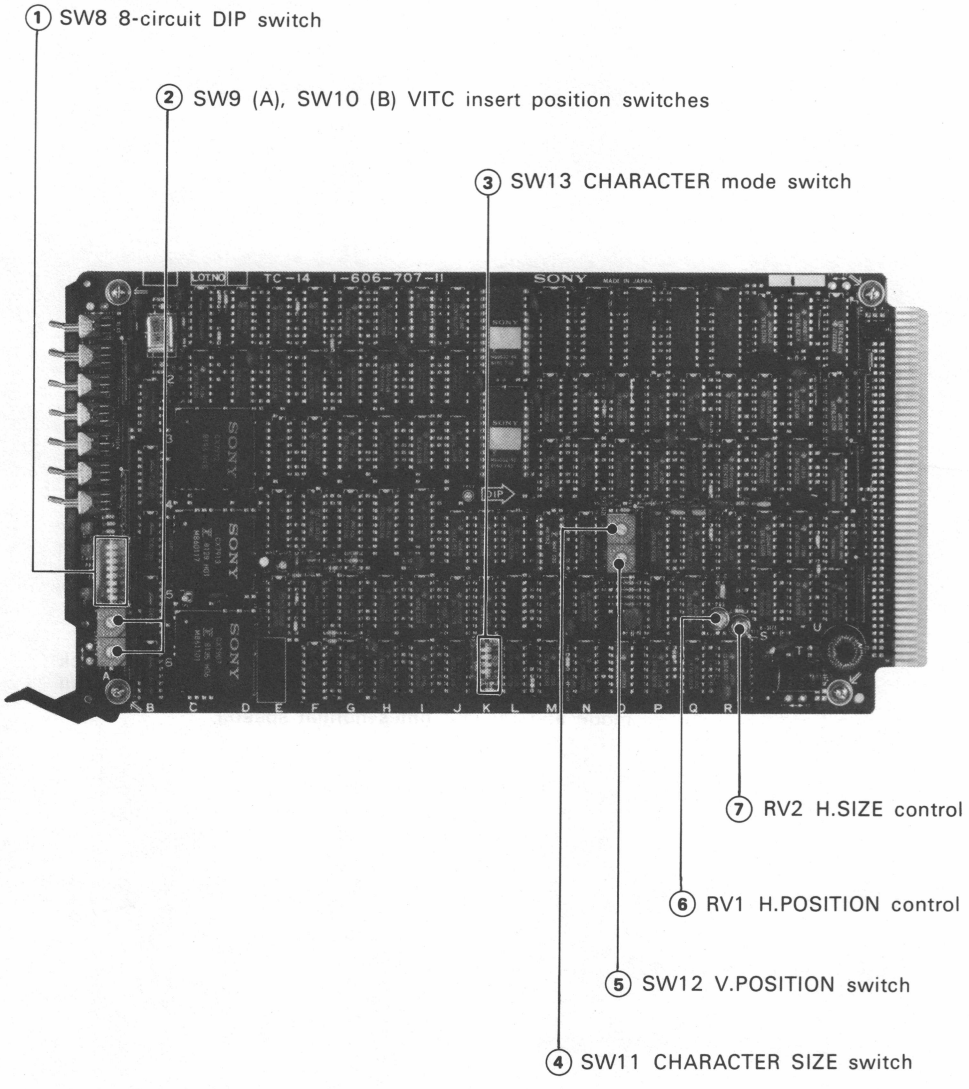
FRAME: Frame jog mode

(In the frame jog mode, the Dynamic Tracking playback with keeping the interlace is possible between the still mode and the +2 times normal speed.)

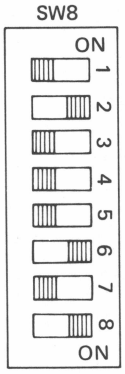
1-6-4. Internal Switches on the TC-14 Board

Settings for the time code and character display are possible using the switches and controls on the TC-14 board.

For the machine with the serial number 10401 and higher, please refer to the manual furnished with the BKH-2015A.



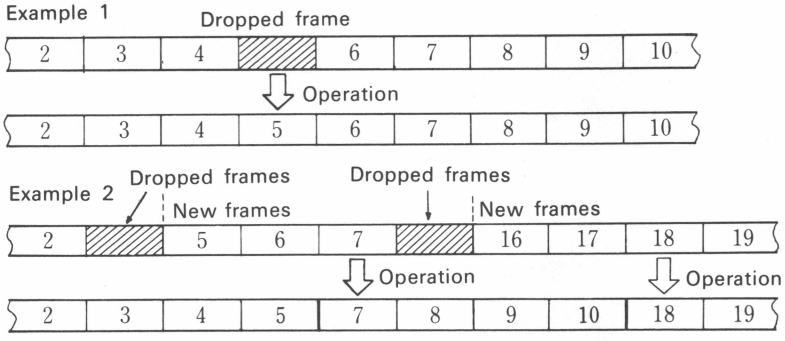
① SW8 8-circuit DIP switch



1	SLTC	*1 LTC timer pulse correction		
2	DUDS	*2 ERROR BYPASS switch		
3	PRTY	*3 LTC even parity		
			SMPTE	EBU
4	$\overline{\text{MPL}}$	System selector switch	OFF	OFF
5	$\overline{\text{EBU}}$		OFF	ON
6	F3	VITC field position selector switch	ON	OFF
7	F2		OFF	ON
8	F1		ON	OFF

*1 LTC timer pulse correction
Timer pulse correction of LTC is readied when this switch is set to ON. Set the DUDS switch to OFF at the same time.
The reading of LTC is switched to that of timer pulse, when the tape speed is slower than 1/10 normal speed or where LTC has not been recorded.
In this case, the CTL-corrected timer pulse should be used. (Set the SW3-4 DIP switch on the CD-17 board to ON and select CTL correction.)

*2 ERROR BYPASS switch
The error bypass circuit operates when this switch is set to OFF.
The error bypass length is determined automatically. The data is renewed from the third frame following the dropped one when more than three frames of continuous new data has been read after the dropped frame. (The error bypass circuit is effective only for the output data of the REMOTE-3 connector.)



*3 LTC even parity
Enters LTC user bit (27th bit for SMPTE, or 59th bit for EBU) as an even parity.
Operates in the ON position.

② SW9 (A) and SW10 (B) VITC insert positon switches

VITC can be inserted into two different lines by setting the SW9(A) and SW10(B) switches as shown in the table below.

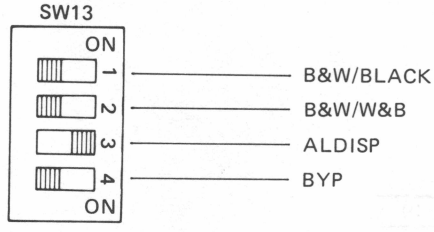
	Switch position	VITC insert line No.
	0	Line 10 (273)
	1	11 (274)
(A) ⇨	2	12 (275)
	3	13 (276)
(B) ⇨	4	14 (277)
	5	15 (278)
	6	16 (279)
	7	17 (280)
	8	18 (281)
	9	19 (282)
	A	20 (283)
	B	21 (284)*
	C	22 (285)*
	D	23 (286)*
	E	24 (287)*
	F	25 (288)*

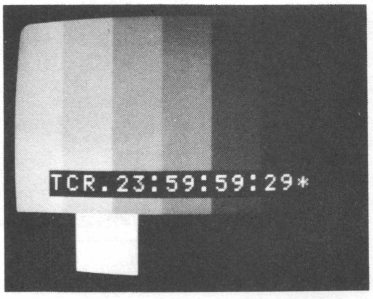
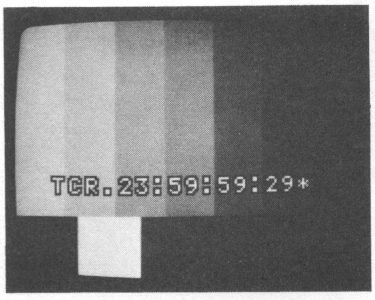
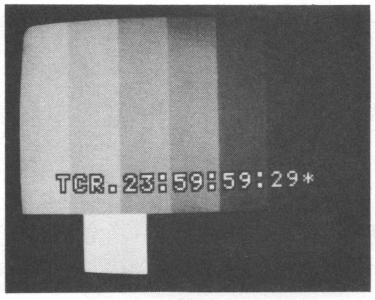
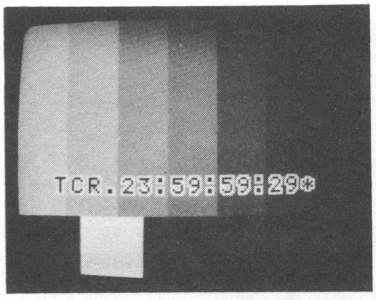
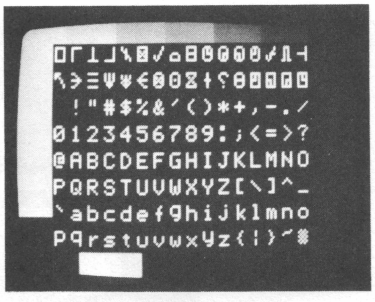
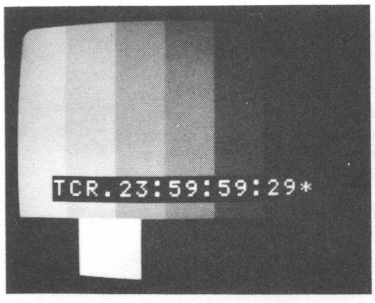
Note: ⇨ shows the factory preset position.

* In the video signal. The VITC can be inserted into these lines but cannot be read.

③ SW13 CHARACTER mode switch (4-circuit DIP switch)

Determines the character mode superimposed on the monitor.
(The size and position of the characters can be set with the SW11, SW12, RV1 and RV2 switches.)



Switch No.	Mode	OFF	ON
1	B & W/BLACK Black background selection	Black background (White character 2 → OFF) 	No black background (White character + black frame 2 → OFF) 
2	B & W/W & B Framing selection (Black character + white frame White character + black frame)	White character + black frame (No black background 1 → ON) 	Black character + white frame (No black background 1 → ON) 
3	ALDISP Character display selection (16 or 128 characters)	128 characters* (Black background 1 → OFF White character 2 → OFF) 	16 characters (Black background 1 → OFF White character 2 → OFF) 
4	BYP (Spare**)	———	BYPASS

* 128-character display is used when the SW9-8 switch on the SY-80 board is set to ON or when the BVH-2500 is controlled by the equipment connected to the REMOTE-2 connector.

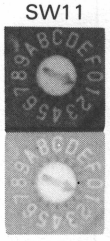
** Adding jumpers (shorting the solder side SP1) allows characters not to be sent to the monitor system, and they can be recorded as part of the video signal. The characters are selected with the READ switch (S1). When the READ switch is set to VITC, the TAPE/EE selector on the function control panel must be set to TAPE/EE. In this case, "*" shown on the display indicates the field numbers as follows:

With "*": field 2 and field 4

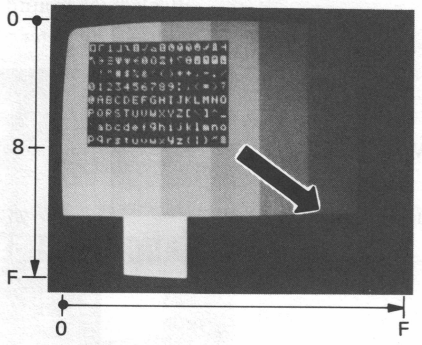
Without "*": field 1 and field 3

④ SW11 CHARACTER SIZE switch

Changes the size of the characters superimposed on the monitor both horizontally and vertically, in 16 steps.



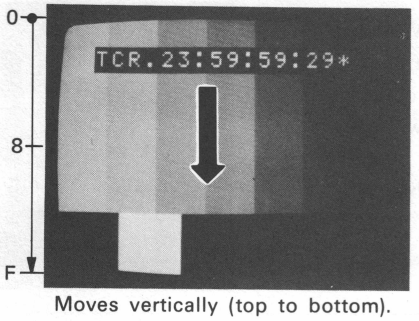
Normally, set to 0 or 1.



⑤ SW12 VERTICAL POSITION switch

Determines the vertical position of the characters superimposed on the monitor, in 16 steps.

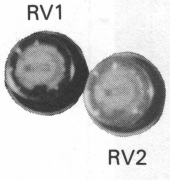
Note: Set the switch to the position where noise does not appear on the characters.

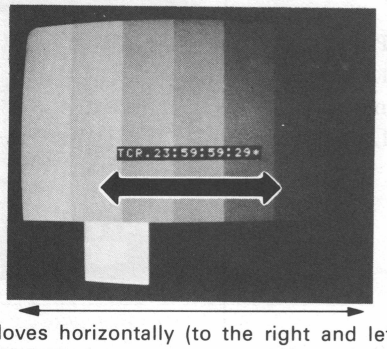


Moves vertically (top to bottom).

⑥ RV1 HORIZONTAL POSITION control

Determines the horizontal position of the characters superimposed on the monitor.

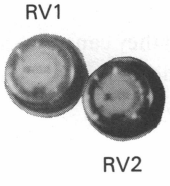


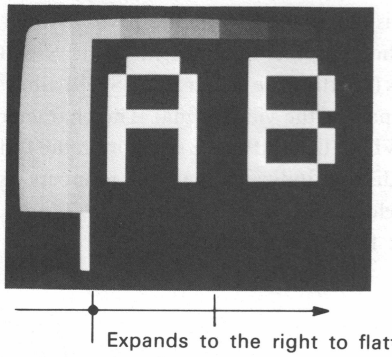


Moves horizontally (to the right and left).

⑦ RV2 HORIZONTAL SIZE control

Fine-adjusts the horizontal size of the characters superimposed on the monitor.

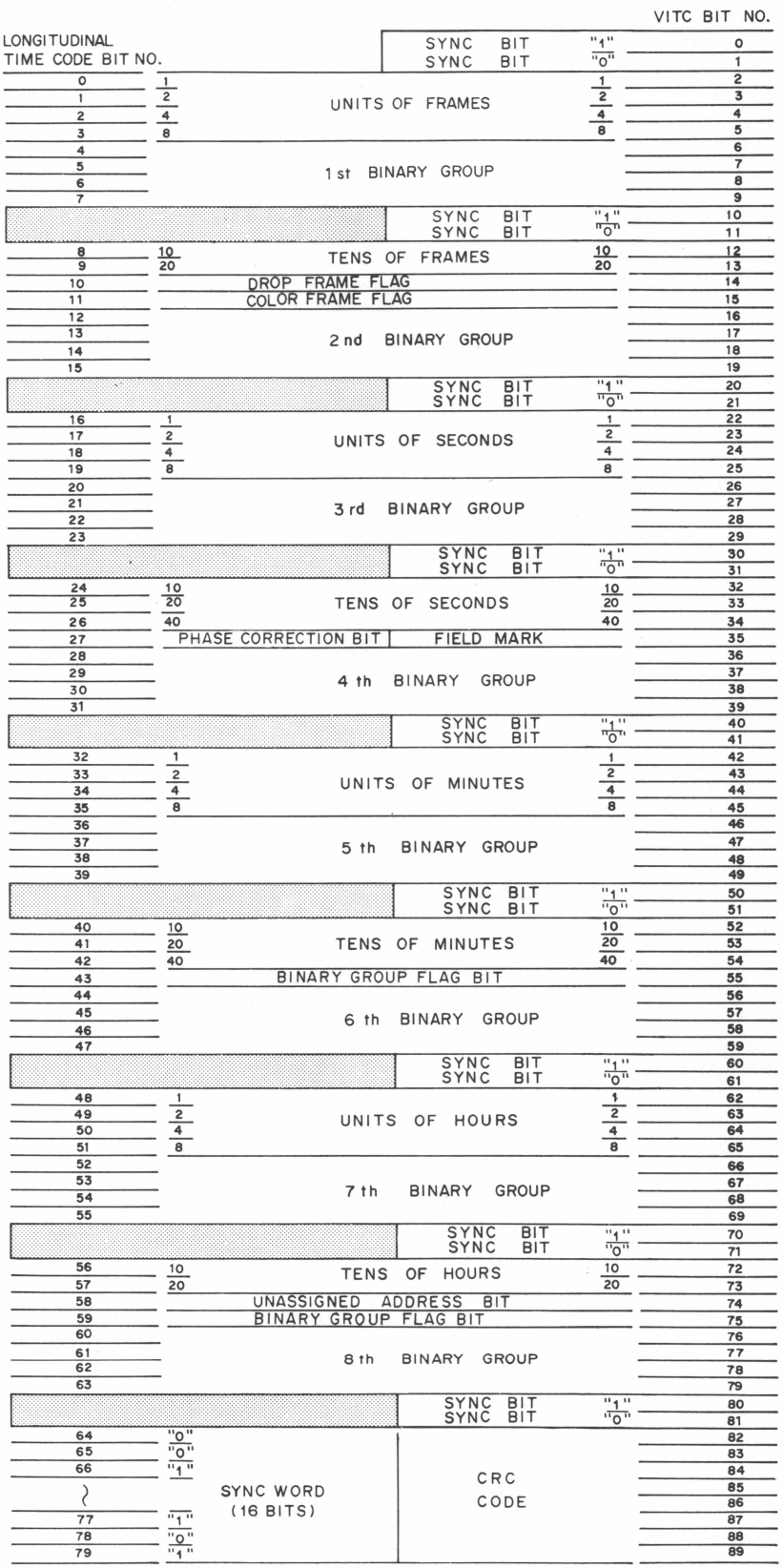




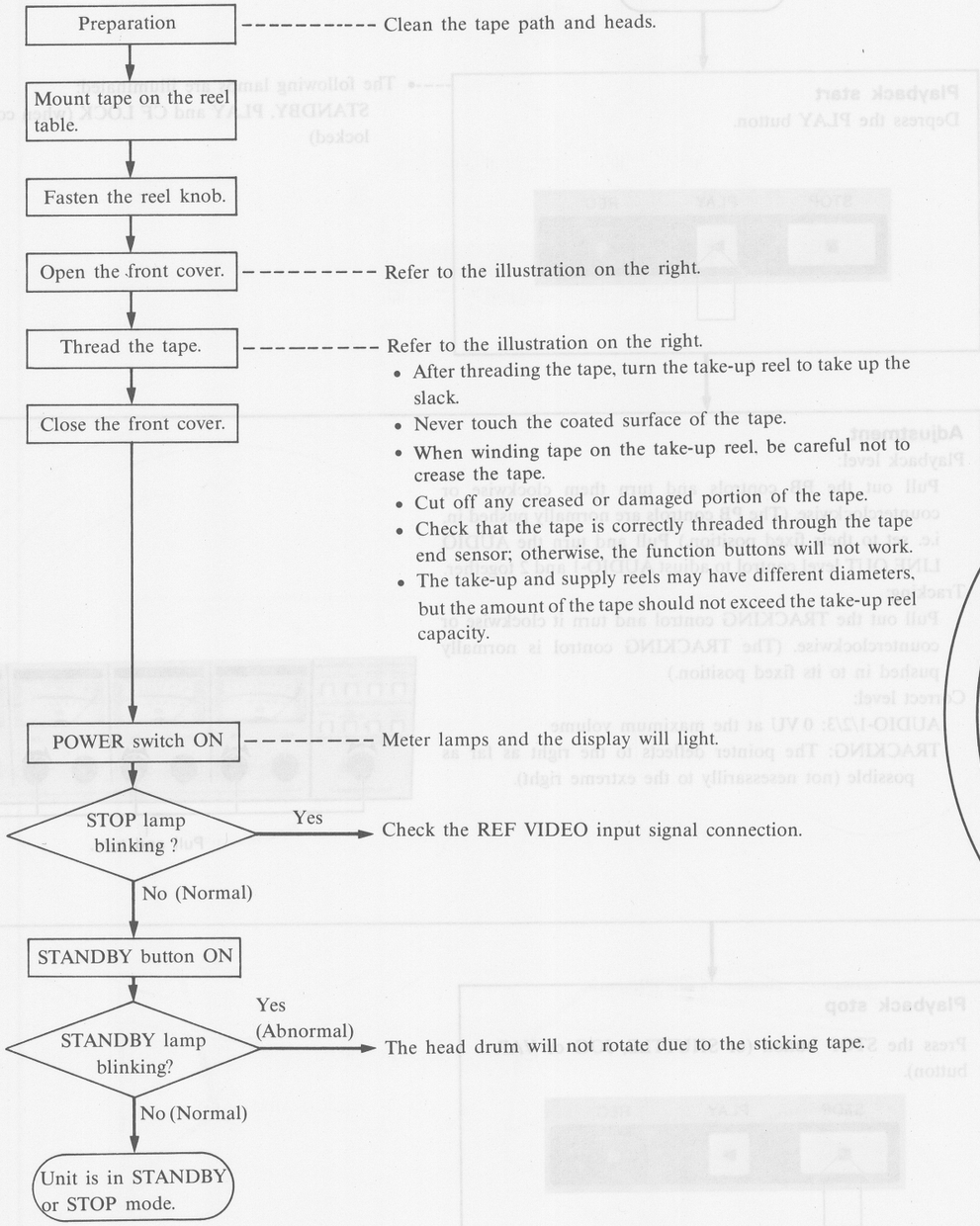
Expands to the right to flatten the characters.

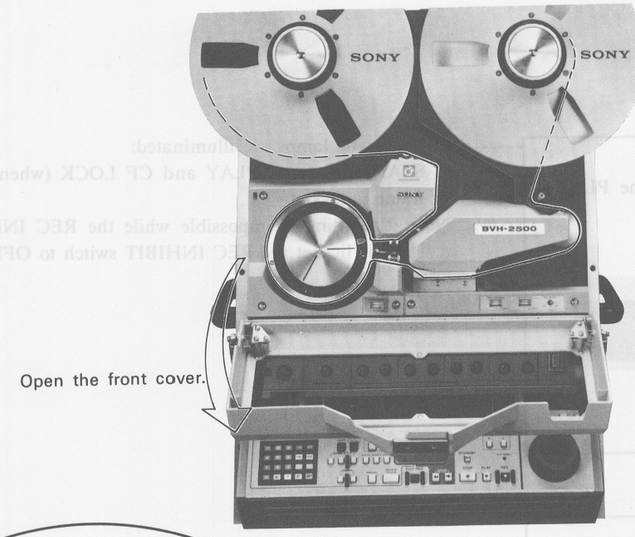
Time Code Format

SMPTE time code and VITC

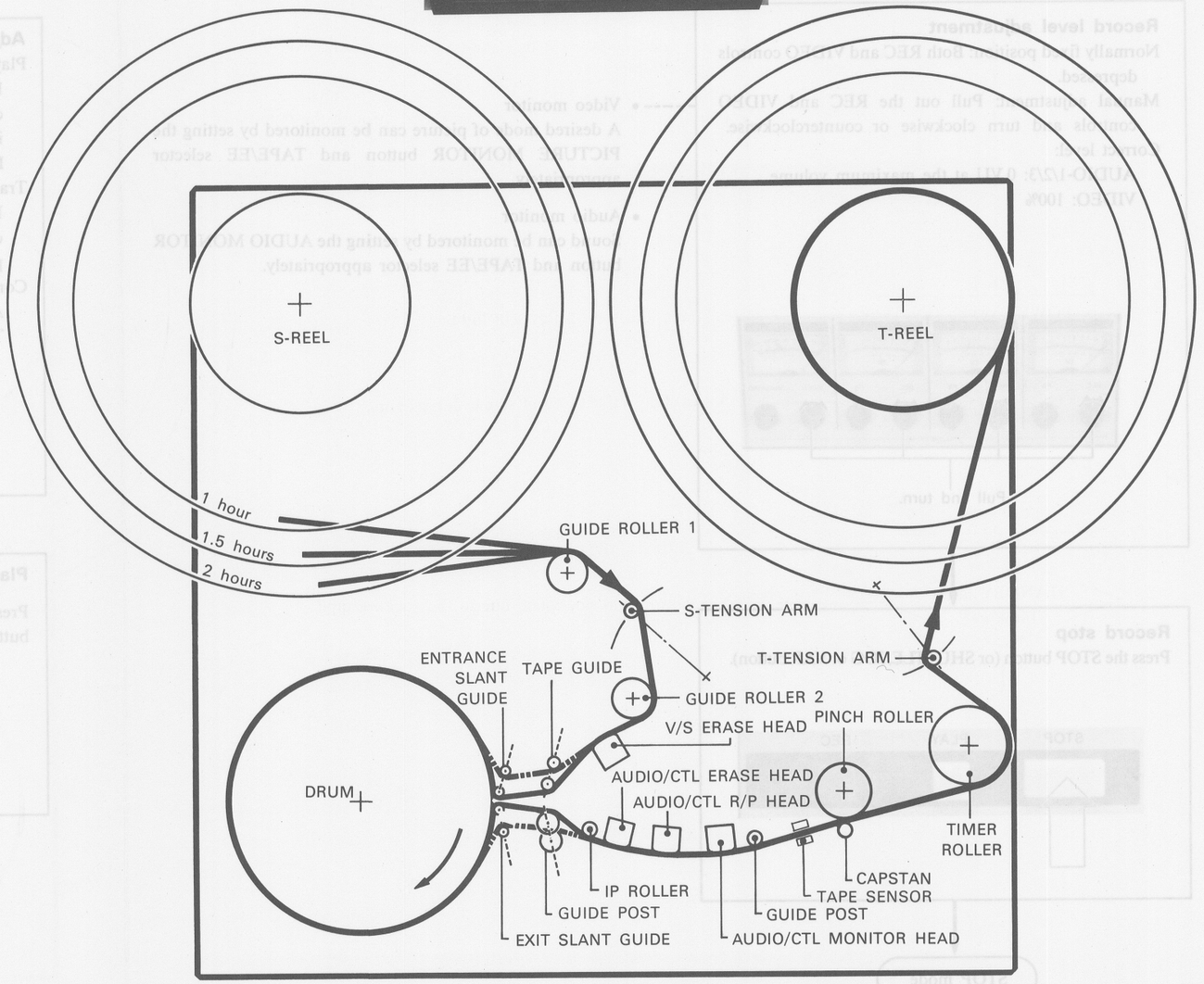


1-7. TAPE THREADING





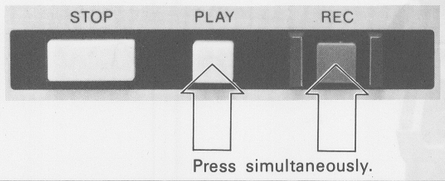
Open the front cover.



1-8. RECORDING

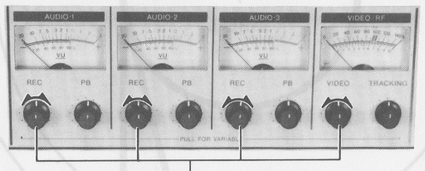
STOP mode

Record start
Keeping the REC button depressed, press the PLAY button.



----• The followng lamps are illuminated:
STANDBY, REC, PLAY and CF LOCK (when color frame is locked)
Note: Recording is impossible while the REC INHIBIT lamp is lit. Set the REC INHIBIT switch to OFF.

Record level adjustment
Normally fixed position: Both REC and VIDEO controls depressed.
Manual adjustment: Pull out the REC and VIDEO controls and turn clockwise or counterclockwise.
Correct level:
AUDIO-1/2/3: 0 VU at the maximum volume
VIDEO: 100%



----• Video monitor
A desired mode of picture can be monitored by setting the PICTURE MONITOR button and TAPE/EE selector appropriately.

• Audio monitor
Sound can be monitored by setting the AUDIO MONITOR button and TAPE/EE selector appropriately.

Record stop
Press the STOP button (or SHUTTLE, JOG or VAR button).

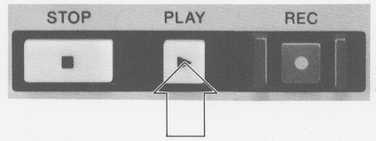
STOP mode

1-9. PLAYBACK

1-9-1. Normal Speed Playback

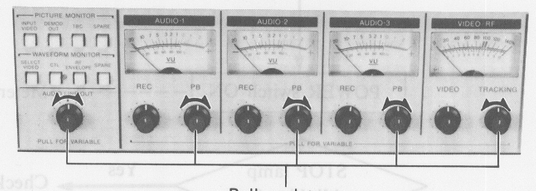
STOP mode

Playback start
Depress the PLAY button.



----• The following lamps are illuminated:
STANDBY, PLAY and CF LOCK (when color frame is locked)

Adjustment
Playback level:
Pull out the PB controls and turn them clockwise or counterclockwise. (The PB controls are normally pushed in, i.e. set to their fixed position.) Pull and turn the AUDIO LINE OUT level control to adjust AUDIO-1 and 2 together.
Tracking:
Pull out the TRACKING control and turn it clockwise or counterclockwise. (The TRACKING control is normally pushed in to its fixed position.)
Correct level:
AUDIO-1/2/3: 0 VU at the maximum volume
TRACKING: The pointer deflects to the right as far as possible (not nesessarilly to the extreme right).



Playback stop
Press the STOP button (or SHUTTLE, JOG or VAR button).

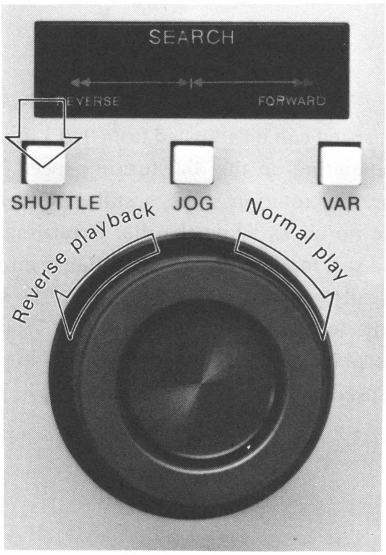
STOP mode

1-9-2. SHUTTLE

STOP mode

- SHUTTLE mode can also be set directly from another mode.

Press the SHUTTLE button (lamp ON).
Turn the SEARCH dial.



- Playback speed can be adjusted from 1/32 to 50 times the normal speed, depending on the position of the dial.
- A still picture is obtained when the dial is set to the center position.
- The dial clicks at the still position, ±1, and ±50 times normal speed positions.
- When the still mode lasts for more than 5 minutes, the unit automatically goes into the STOP mode. To stop this from happening, set the S9-6 switch on the SY-79 board to OFF.
- Noiseless playback is possible from −1 to +3 times the normal speed.

Press the button other than SHUTTLE.

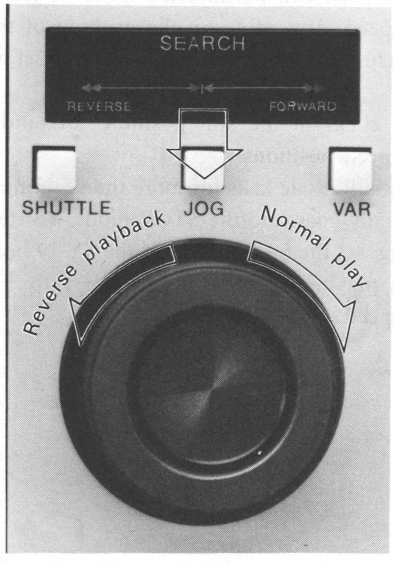
SHUTTLE mode is turned OFF.

1-9-3. JOG

STOP mode

• JOG mode can also be set directly from another mode.

Press the JOG button (lamp ON).
Turn the SEARCH dial.



• Playback speed can be adjusted from 0 to 3 times the normal speed, depending on the dial turning speed.
• When the dial rotation stops, a still picture is obtained.
• There are no clicks while the dial is turning.
• When the still mode lasts for more than 5 minutes, the unit automatically goes into the STOP mode. To stop this from happening, set the S9-6 switch on the SY-79 board to OFF.
• Noiseless playback is possible from −1 to +3 times the normal speed.

Press the STOP button.

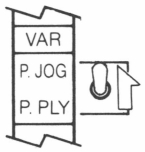
• PLAY, SHUTTLE, or VAR button may be pressed instead.

STOP mode

1-9-4. PROGRAM JOG

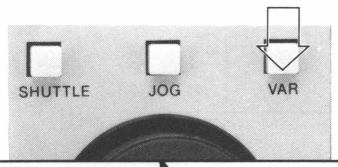
STOP mode

Set the VAR switch on the SY-79 board to P.JOG.



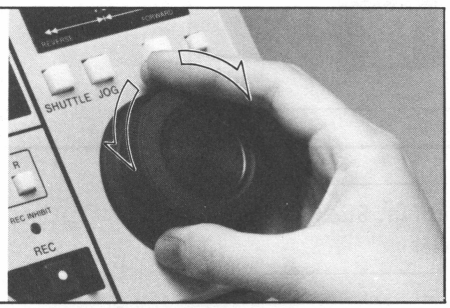
Turn the SEARCH dial.
(Program jog speed is reserved.)

Press the VAR button. (Playback starts at the reserved speed.)



Tun the SEARCH dial. (Variable speed program jog mode)

Speed can be varied from −1 to +3 times normal.



Press the SHUTTLE button. → STILL mode
Press the PLAY button. → PLAY mode

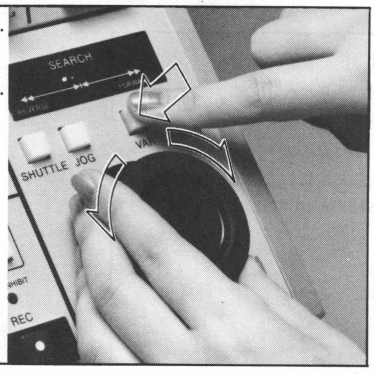
Press the STOP button to return to STOP mode.

1-9-5. PROGRAM PLAY

STOP mode

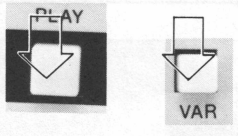
Set the VAR switch on the SY-79 board to P.PLY.

Hold down the VAR button and turn the SEARCH dial.
(The program play speed is reserved.)
The memorized value of the tape speed is displayed in %.



Speed can be varied from −20% to +20% normal speed.

Hold down the VAR button and press the PALY button. (Play-back starts at the selected speed.)



Hold down the VAR button and turn the SEARCH dial.
(variable speed program play mode)

Press the SHUTTLE button. → STILL mode
Press the PLAY button → PLAY mode

Press the STOP button to return to STOP mode.

1-9-6. VAR (Variable) MEMORY Playback

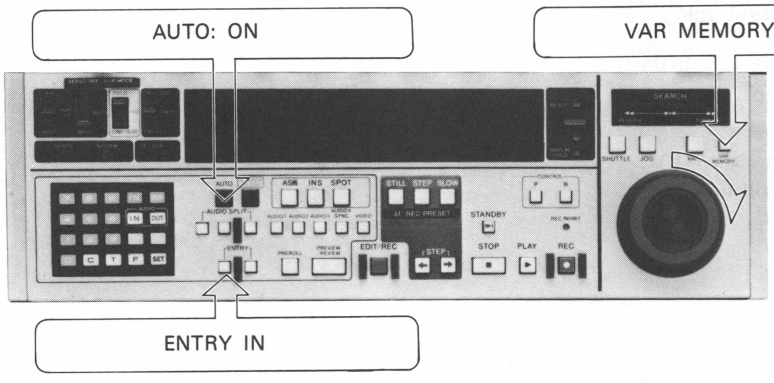
STOP mode ---------- Other modes, such as PLAY, SHUTTLE and JOG, are also possible.

Press the AUTO button (lamp ON).

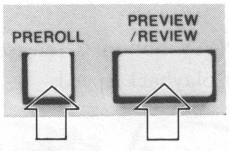
Press the VAR MEMORY button (lamp ON).

Enter the memory start point (IN point).
Run the tape in the SHUTTLE, PROGRAM JOG or other mode and stop the tape at the desired point.
Press the ENTRY IN button and enter the IN point.

Set the initial speed with the SEARCH dial.



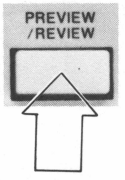
Press the PREROLL and PREVIEW/REVIEW buttons simultaneously.
"V" is displayed in block 5 on the display.
The tape, after moving to the preroll point, starts running at the initially set speed.
When the tape passes the IN point, a buzzer sounds.



Turn the SEARCH dial to memorize a speed curve.
After the buzzer sounds, the VAR MEMORY lamp blinks. While the lamp is blinking, the SEARCH dial operation is being memorized.
The SEARCH dial is continuously variable from −1 to +3 times the normal speed, and the speed variation curve is memorized.

Press the STOP button to stop the memory operation.

Press the PREVIEW/REVIEW button. (Playback will be performed according to the memorized curve.)



1. The tape runs to the preroll point.
   [(IN point) − (preroll time (sec.) × initial speed)]
2. After the preroll run, the tape starts running at the initial set speed.
3. When the tape passes the IN point, the buzzer sounds and the display indication begins blinking. The tape is played back according to the curve stored in memory.
4. When the tape reaches the memory end, the display is turned off and the normal PROGRAM JOG mode is entered.

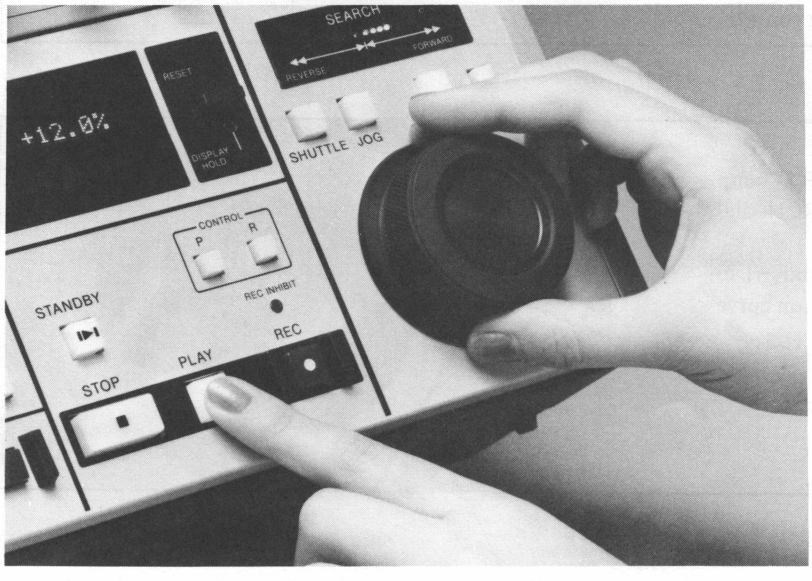
- To play back this section once more, press the PREVIEW/REVIEW button again.

Standby mode for the VAR MEMORY playback

When only the PREROLL button is pressed, the tape runs to the preroll point and stops there (standby mode for the VAR MEMORY playback).
To start playback at the desired time, press the PREVIEW/REVIEW button before the start time by the preroll time, and the playback at the memorized curve will begin at that time.

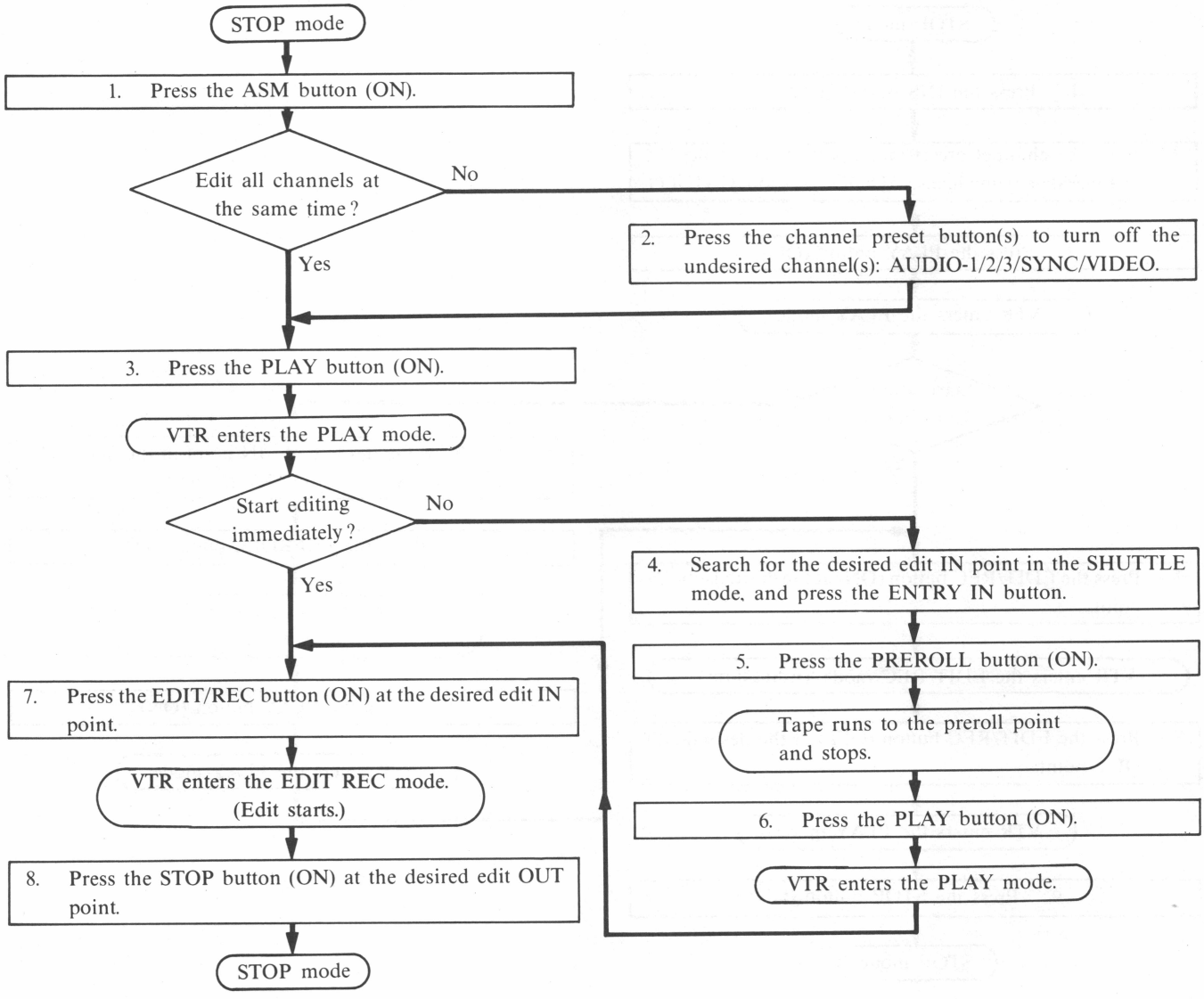
1-9-7. Capstan Override

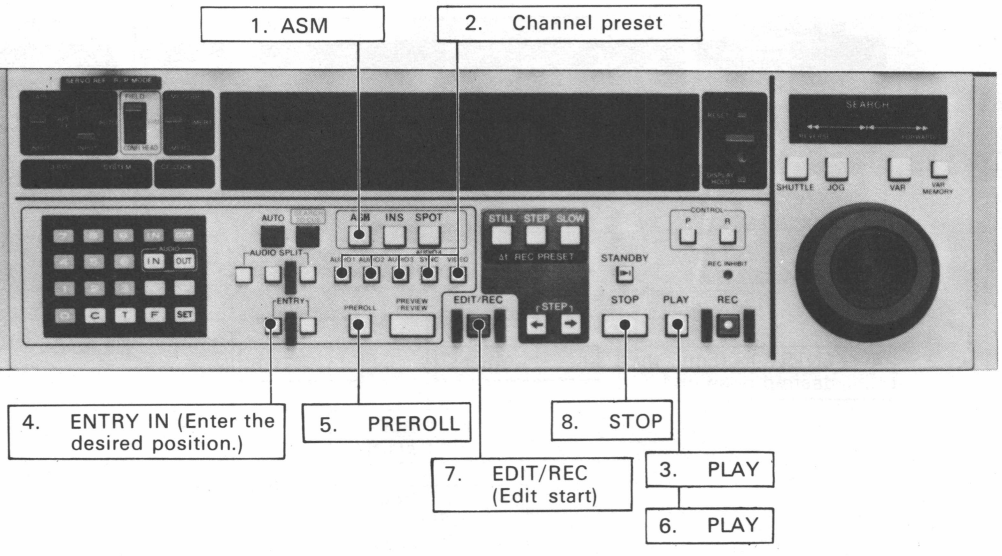
To synchronize with another VTR, turn the SEARCH dial during playback with the PLAY button depressed. Adjustment can be made in the range of ±15% of the normal speed.
The tape speed during this operation is indicated in % on the display.
When the PLAY button is released, the speed returns to the normal (×1) playback speed.



1-10. MANUAL EDITING

1-10-1. ASSEMBLE Editing





1-10-2. INSERT Editing

STOP mode

1. Press the INS button (ON).

2. Press the channel preset button(s) to turn the desired channel(s) on (lamp lights): AUDIO-1/2/3/SYNC/VIDEO.

3. Press the PLAY button (ON).

VTR enters the PLAY mode.

Start editing immediately?

No

Yes

4. Search for the desired edit IN point in the SHUTTLE mode, and press the ENTRY IN button.

5. Press the PREROLL button (ON).

Tape runs to the preroll point and stops.

6. Press the PLAY button (ON).

VTR enters the PLAY mode.

7. Press the EDIT/REC button (ON) at the desired edit IN point.

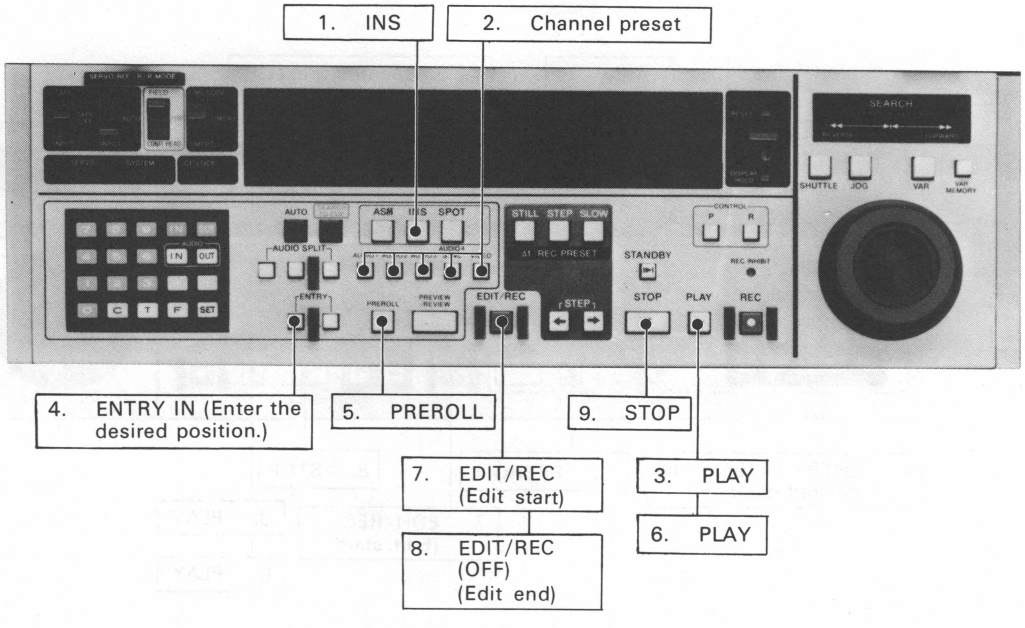
VTR enters the EDIT REC mode. (Edit starts.)

8. Press the EDIT/REC button (OFF) at the desired edit OUT point.

VTR enters the PLAY mode.

9. Press the STOP button (ON).

STOP mode

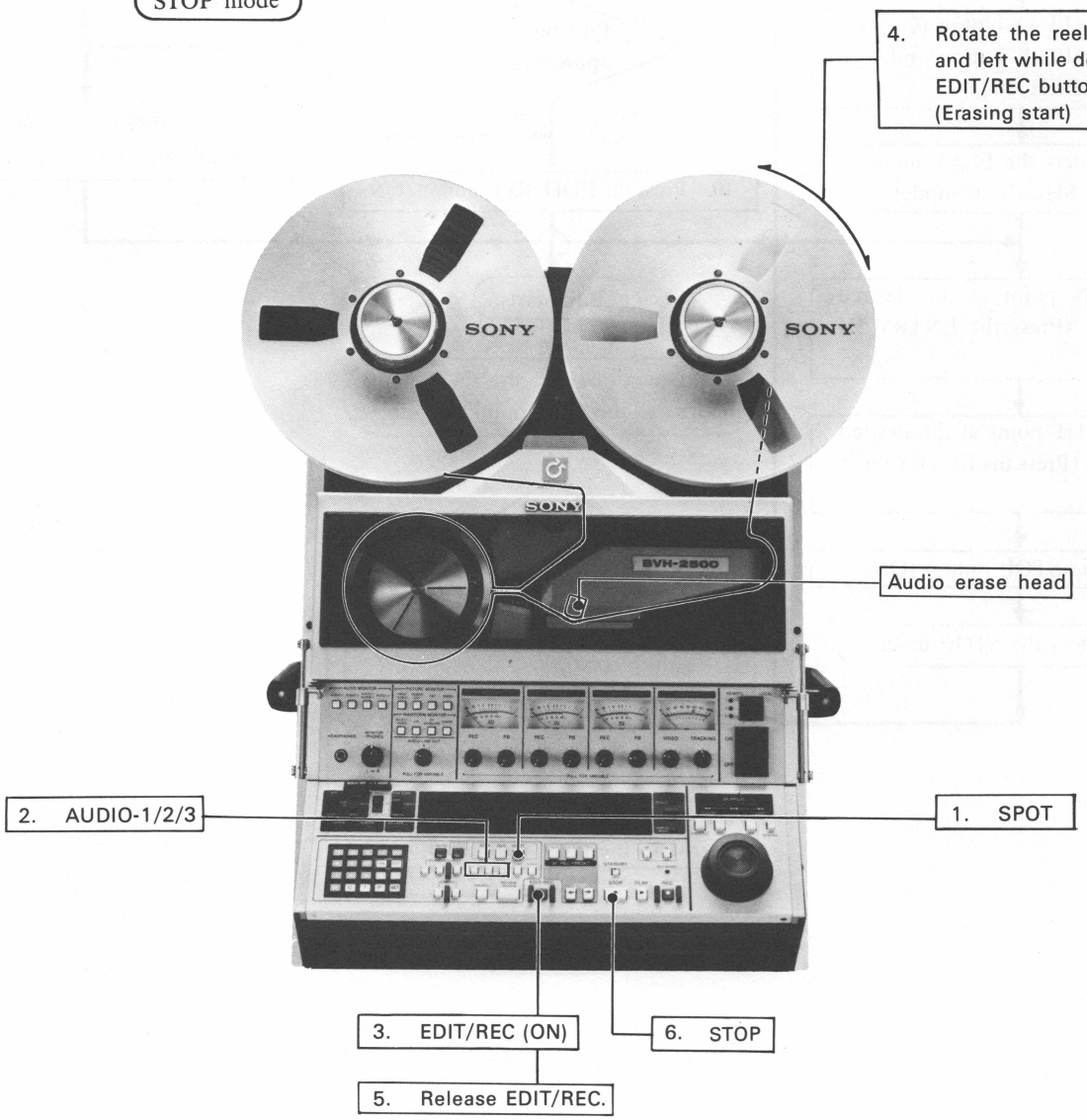


1-10-3. Spot Erase

STOP mode — Press the STANDBY button so that the STANDBY lamp lights.

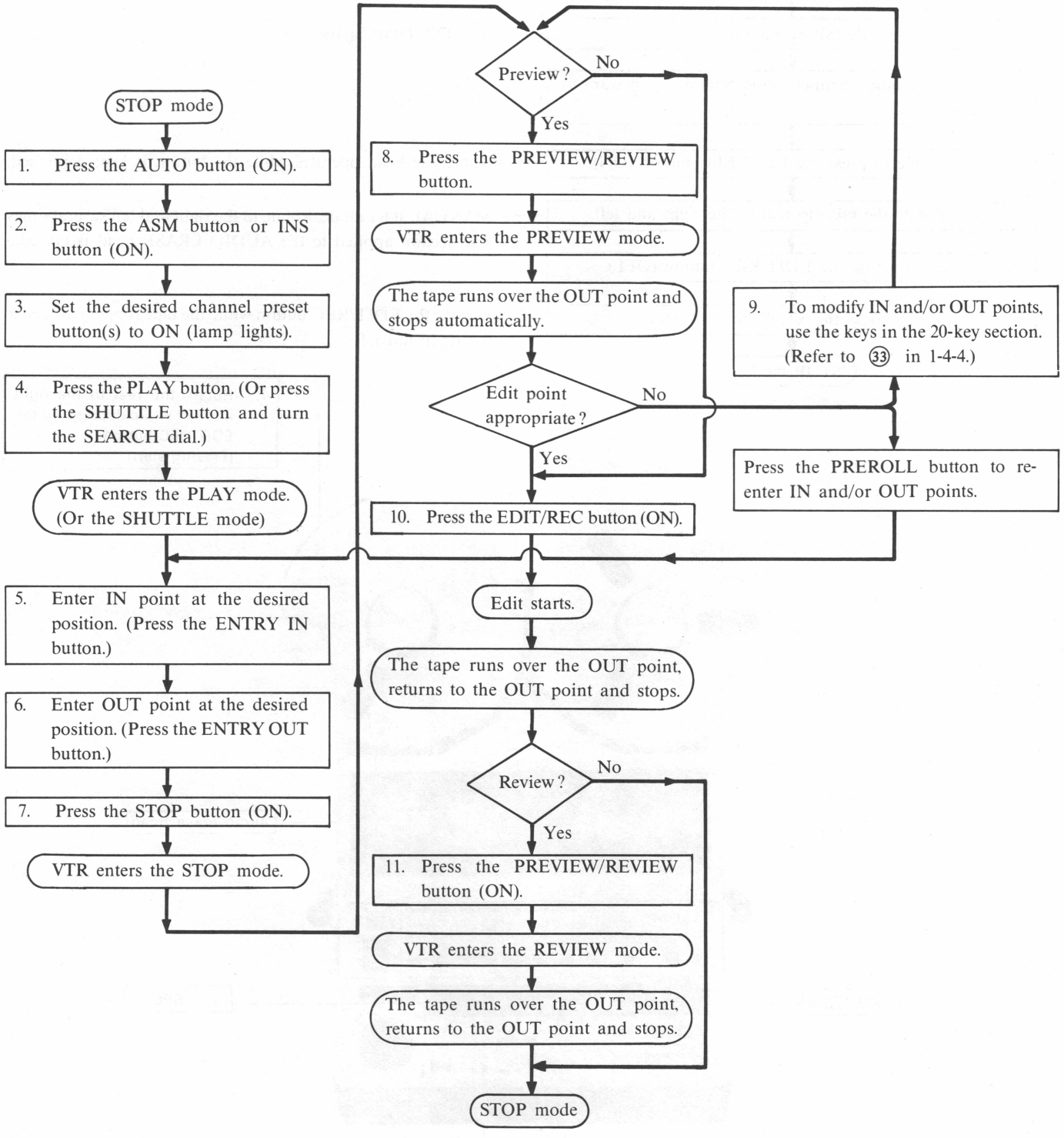
1. Press the SPOT button (ON). — The INS lamp lights.
2. Press the audio channel preset button(s) you want to erase (ON). — AUDIO-1/2/3
3. Continue to press the EDIT/REC button (ON). — The erase head operates while the button is kept depressed.
4. Rotate the take-up reel to the right and left. — MANUAL JOG mode. Rotate to the right and left several times. The section applied to the AUDIO ERASE head is erased.
5. Release the EDIT/REC button (OFF). — Release the EDIT/REC button while the tape is being rotated to the right and left.
6. Press the STOP button (ON).

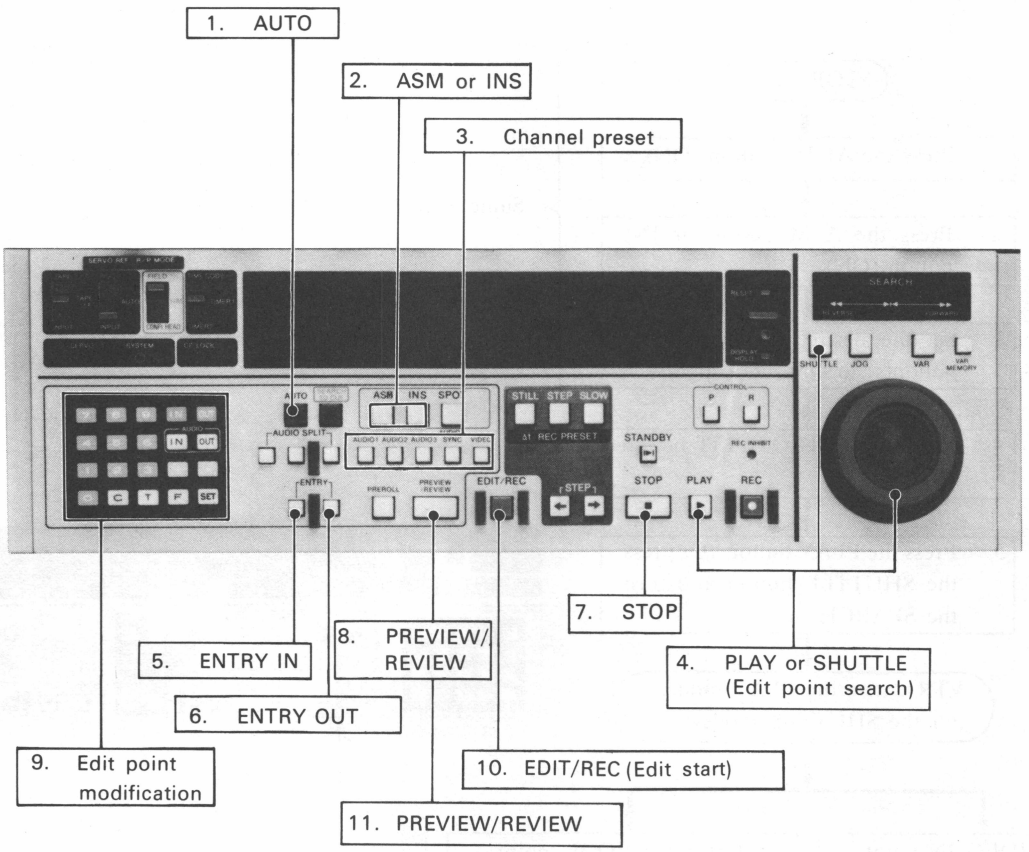
STOP mode



1-11. AUTOMATIC EDITING

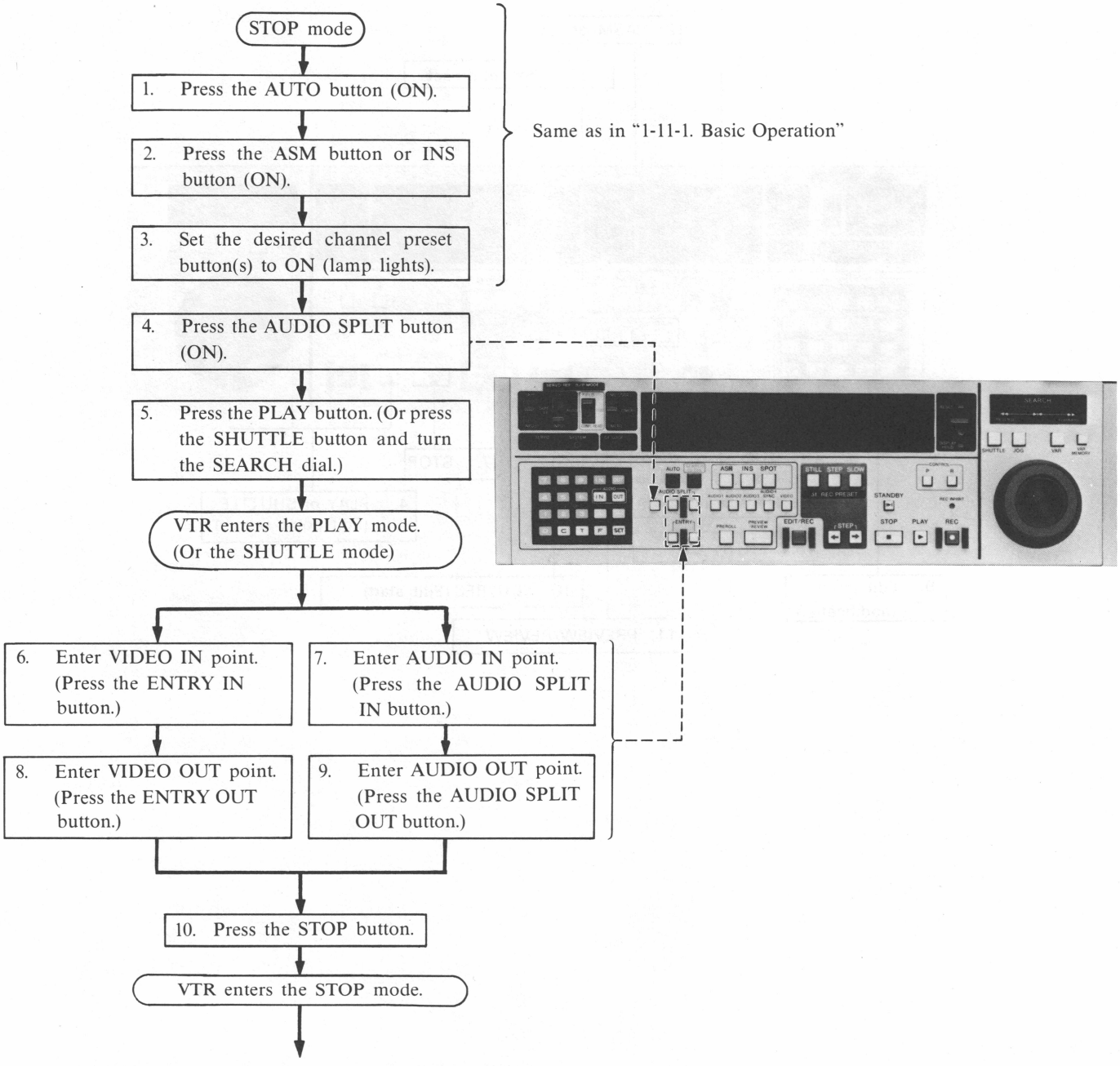
1-11-1. Basic Operation




1. AUTO
2. ASM or INS
3. Channel preset
7. STOP
4. PLAY or SHUTTLE (Edit point search)
5. ENTRY IN
8. PREVIEW/ REVIEW
6. ENTRY OUT
9. Edit point modification
10. EDIT/REC (Edit start)
11. PREVIEW/REVIEW

1-11-2. AUDIO SPLIT Editing

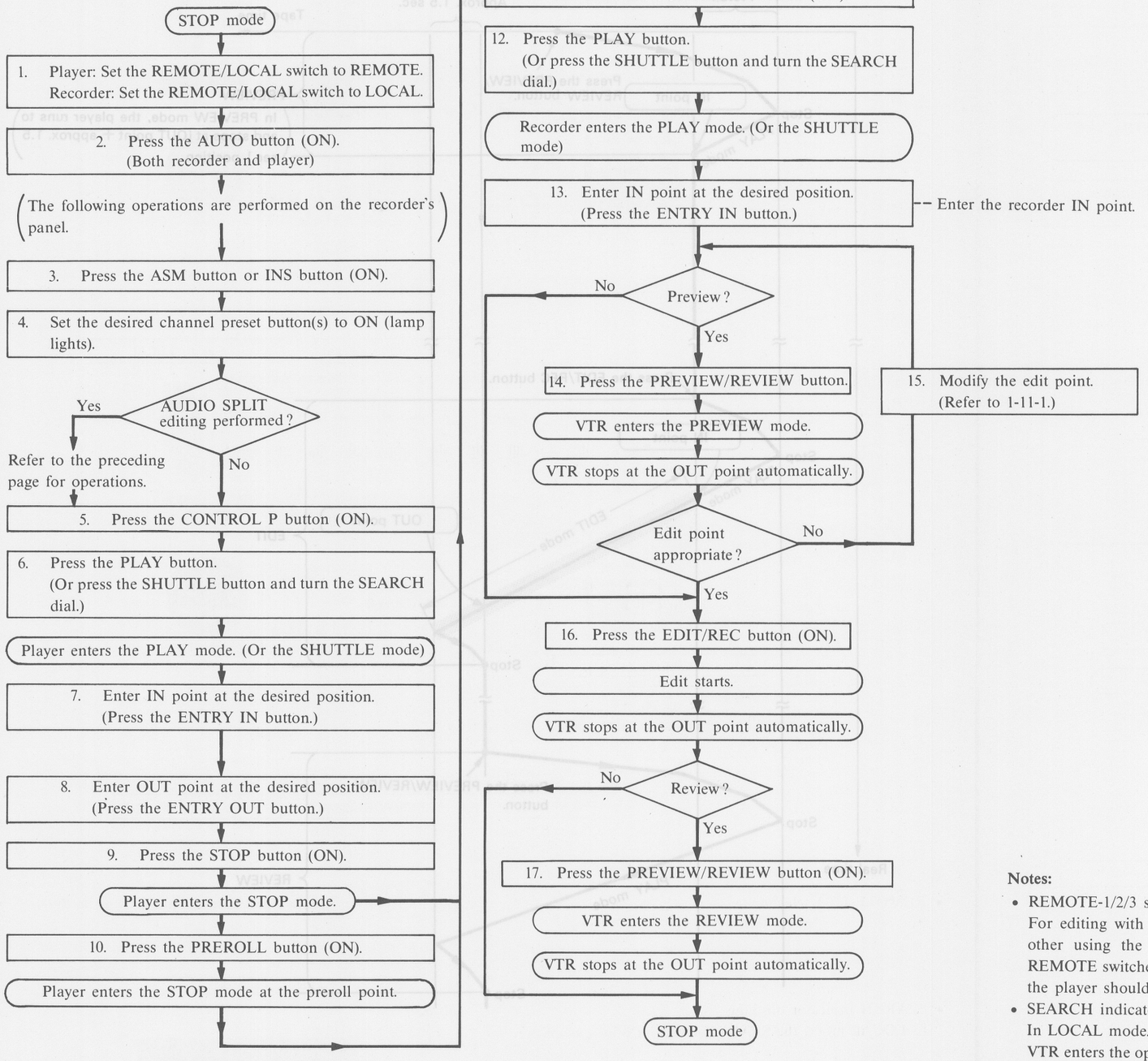
Enter the AUDIO IN and OUT points and the VIDEO IN and OUT points to perform AUDIO SPLIT editing. Apart from this, operations are basically the same as those described in "1-11-1. Basic Operation".



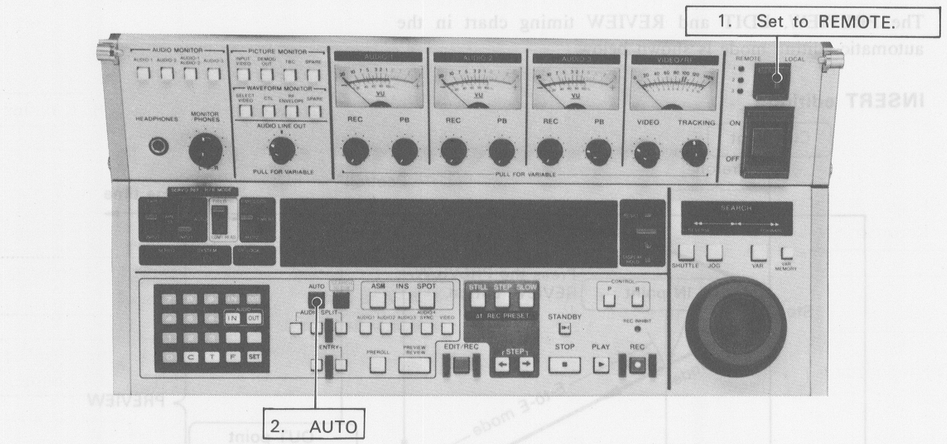
- Edit point modification following PREVIEW is also the same as in 1-11-1. In brief, modify the edit point using the 20-key section (including the AUDIO IN and OUT keys), or re-enter the edit point after PREROLL.
- After AUDIO SPLIT editing has been completed, the AUDIO SPLIT lamp remains illuminated. Therefore, if AUDIO SPLIT editing is not to be performed again, press the AUDIO SPLIT button to turn the lamp off.

1-11-3. Editing with Two VTRs (Player and Recorder)

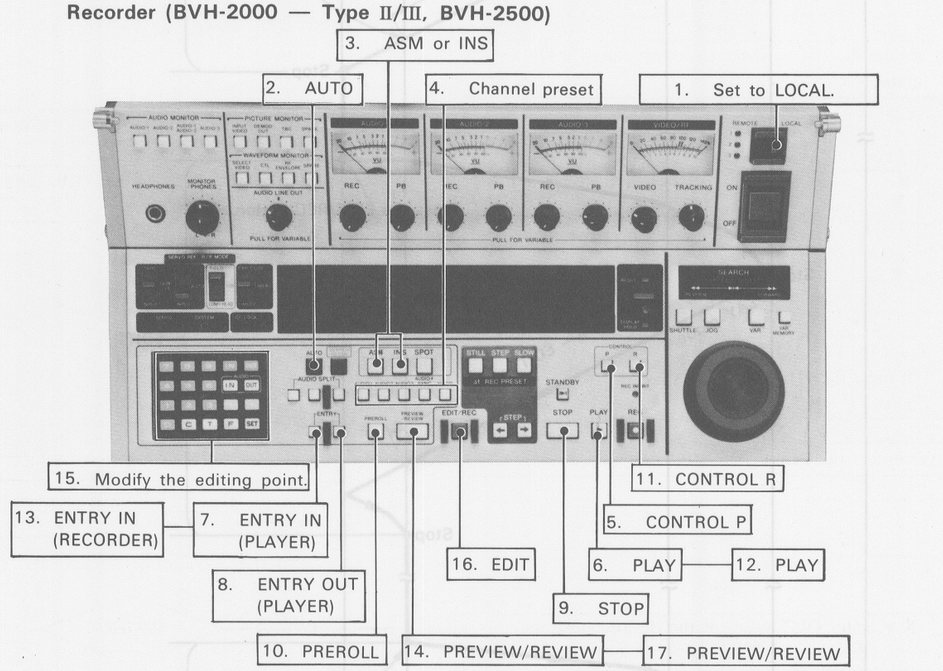
Editing is possible with a BVH-2500 and a BVH-2000.



Player (BVH-2000 — Type I/II/III, BVH-2500)

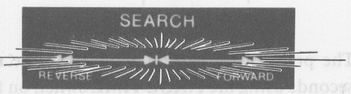


Recorder (BVH-2000 — Type II/III, BVH-2500)



Notes:

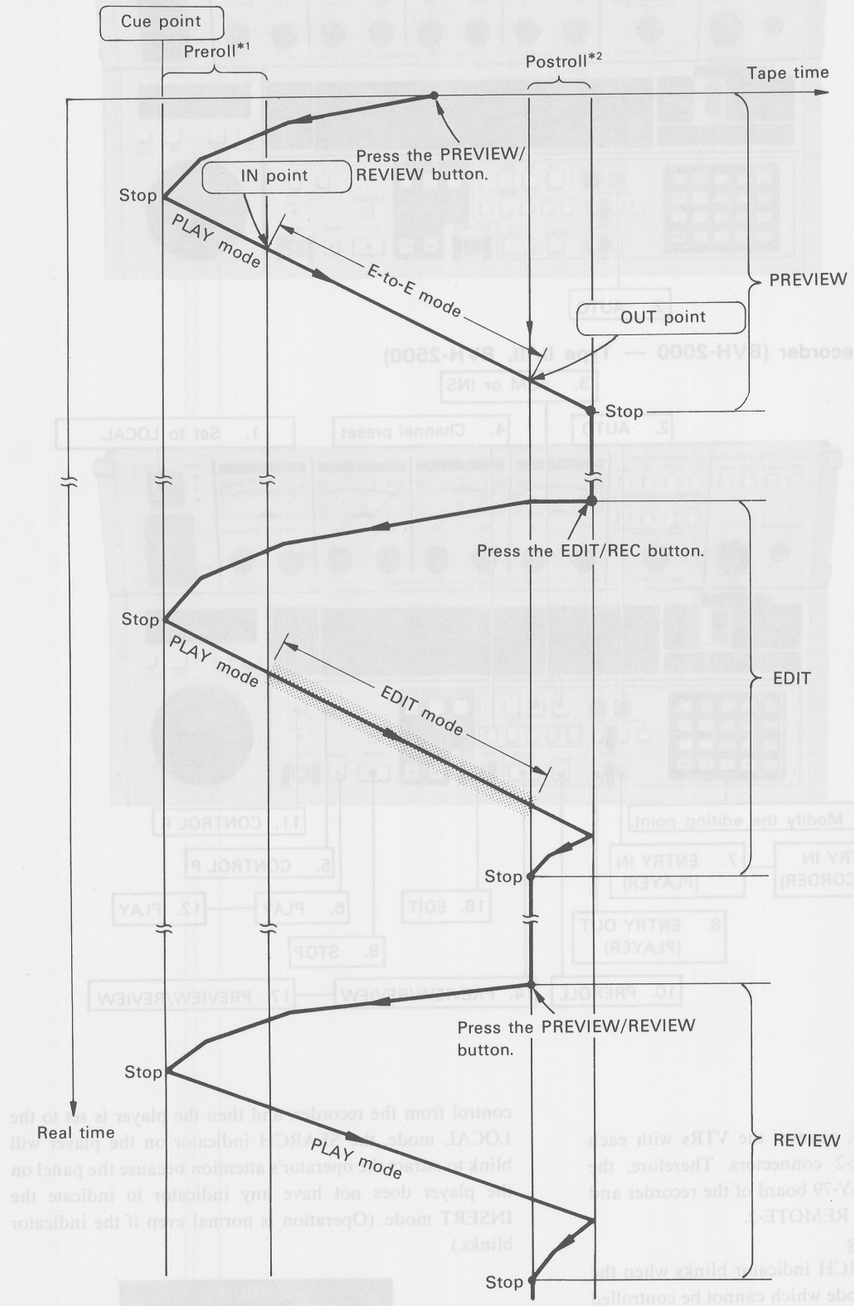
- REMOTE-1/2/3 selection
  For editing with two VTRs, connect the VTRs with each other using the REMOTE-2 connectors. Therefore, the REMOTE switches on the SY-79 board of the recorder and the player should be set to REMOTE-2.
- SEARCH indicator blinking
  In LOCAL mode, the SEARCH indicator blinks when the VTR enters the operation mode which cannot be controlled by the buttons on the existing function control panel. For example, if a BVH-2000 player with a Type-1 panel in the REMOTE mode is set to the INSERT mode by remote control from the recorder, and then the player is set to the LOCAL mode, the SEARCH indicator on the player will blink to attract the operator's attention because the panel on the player does not have any indicator to indicate the INSERT mode. (Operation is normal even if the indicator blinks.)



The indicators blink.

The PREVIEW, EDIT and REVIEW timing chart in the automatic editing mode is shown below.

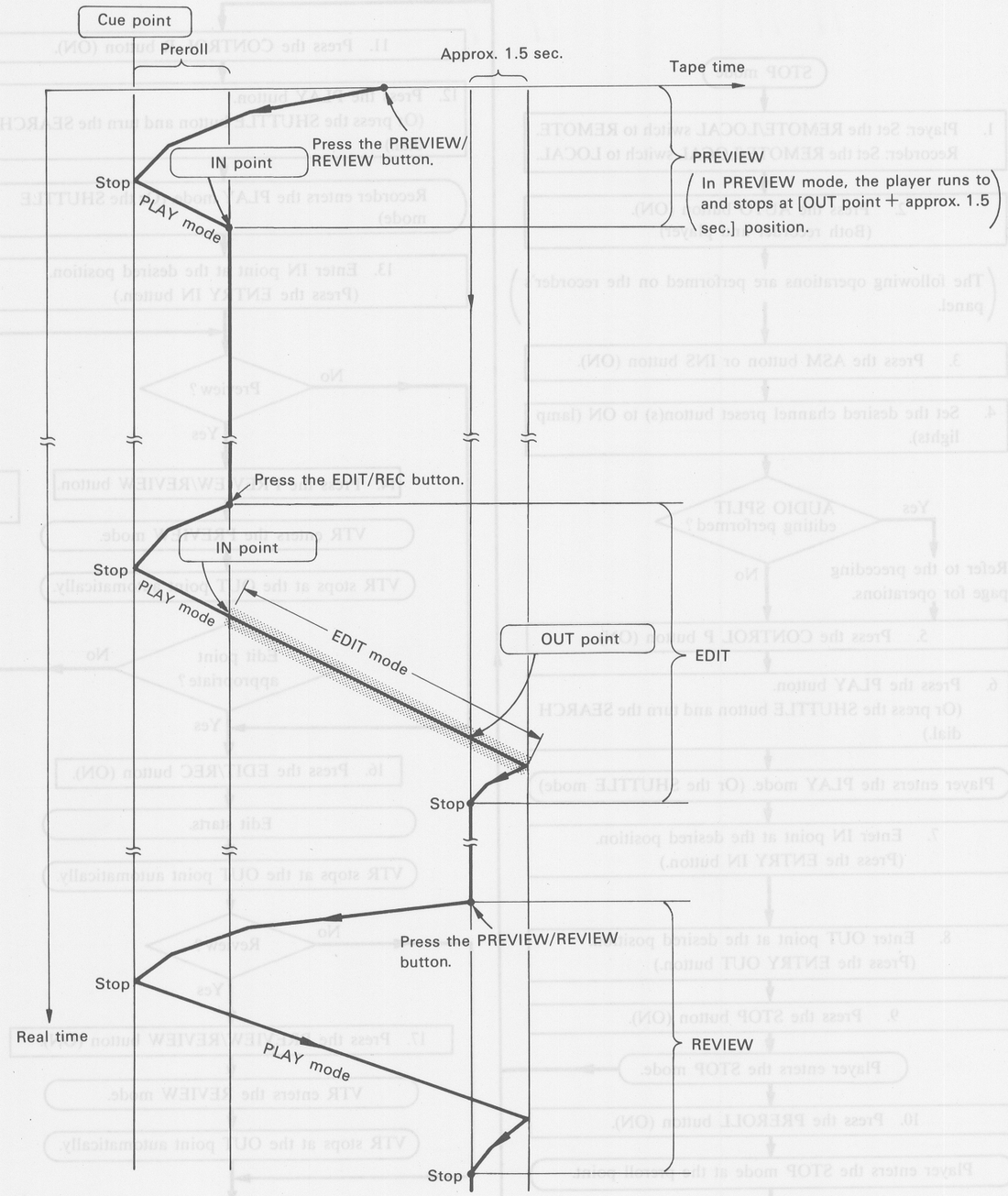
INSERT editing



*1 The preroll time can be changed in the range of 0 to 15 seconds using the P.ROL TIME switch on the SY-79 board.

*2 The postroll time is the same as the preroll time.

ASSEMBLE editing



1-11-4. Editing Monitor

The monitor output signal in the PREVIEW and EDIT modes varies as shown in the table below, depending on the setting of the TAPE/EE selector. The signal phase changes at the points indicated with "×" in the table and consequently the monitor picture may be distorted. However, the distortion occurs only on the monitor picture and the editing is performed normally.

Video monitor

	TAPE/EE selector	IN point ▼		OUT point ▼
PREVIEW	TAPE	R/P head OFF TAPE	EE	R/P head OFF TAPE
	TAPE/EE	R/P head OFF TAPE	EE	R/P head OFF TAPE
EDIT	TAPE	R/P head OFF TAPE ×	CONFI head OFF TAPE* ×	R/P head OFF TAPE
	TAPE/EE	R/P head OFF TAPE	EE	R/P head OFF TAPE

* The monitor output signal is in EE mode when the S9-1 switch on the SY-80 board is set to ON.

Audio monitor

LINE OUTPUT connector

	TAPE/EE selector	IN point ▼		OUT point ▼
PREVIEW	TAPE	R/P head OFF TAPE	EE	R/P head OFF TAPE
EDIT	TAPE/EE			

MONITOR OUTPUT connector

	TAPE/EE selector	IN point ▼		OUT point ▼
PREVIEW	TAPE	R/P head OFF TAPE	EE	R/P head OFF TAPE
	TAPE/EE			
EDIT	TAPE	MONITOR head OFF TAPE	MONITOR head OFF TAPE	MONITOR head OFF TAPE
	TAPE/EE	R/P head OFF TAPE	EE	R/P head OFF TAPE

1-11-5. Blinking and Lighting of Lamps in the Automatic Editing Mode

The various lamps blink in the automatic editing mode as shown in the table below to guide the editing operation when the S8-8 switch on the SY-80 board is set to ON. Press the appropriate buttons in the sequence indicated.

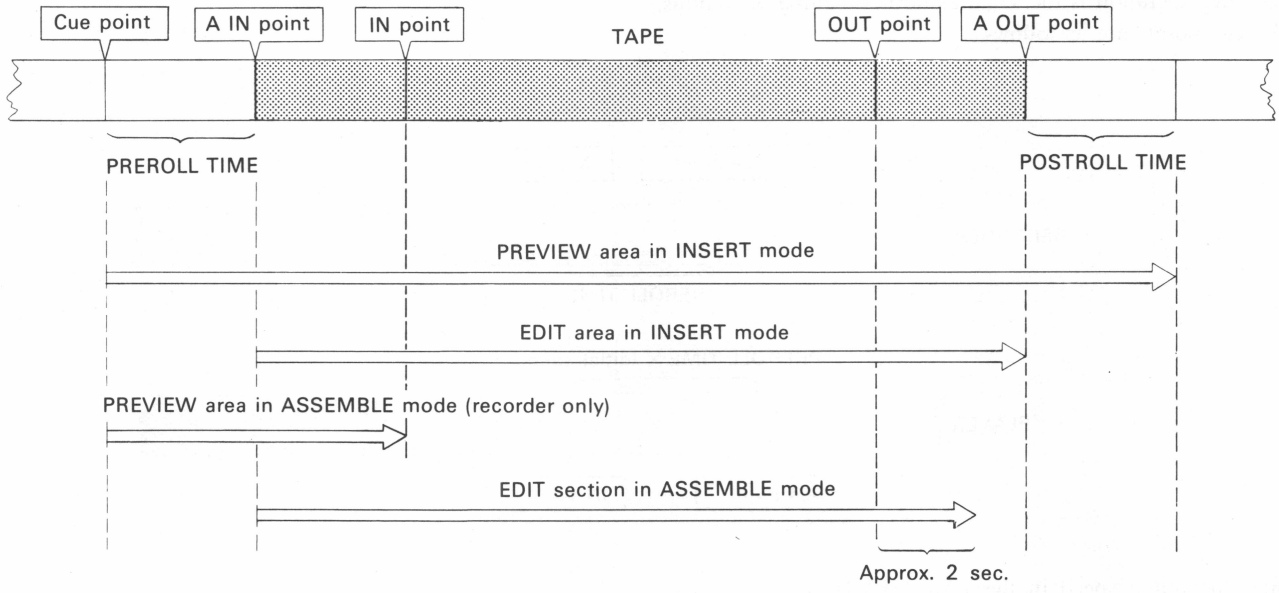
×: OFF ◒: Blinking ○: ON

Steps	Lamps		ENTRY IN	ENTRY OUT	A-IN	A-OUT	PREVIEW /REVIEW	EDIT/REC	Remarks
1	AUTO OFF		×	×	×	×	×	×	
2	AUTO ON	AUTO ON	◒	◒	×	×	×	×	
3		AUDIO SPLIT ON	◒	◒	◒	◒	×	×	
4		ENTRY IN only	○	◒	×(◒)*	×(◒)	◒	×	When channel preset button is turned off.
								◒	When channel preset button is turned on.
5		ENTRY OUT only	◒	○	×(◒)	×(◒)	×	×	
6		Both ENTRY IN and OUT	○	○	—	—	◒	×	
								◒	
7		PREROLL button ON	○	—	—	—	×	×	
8		PREVIEW/REVIEW button ON	○	—	—	—	○	×	PREVIEW mode
9		EDIT/REC button ON	○	—	—	—	×	○	
10		EDIT mode end	×	×	×	×	◒	×	
11		PREVIEW/REVIEW button ON	×	×	×	×	○	×	REVIEW mode Return to step 2 after REVIEW mode is finished.

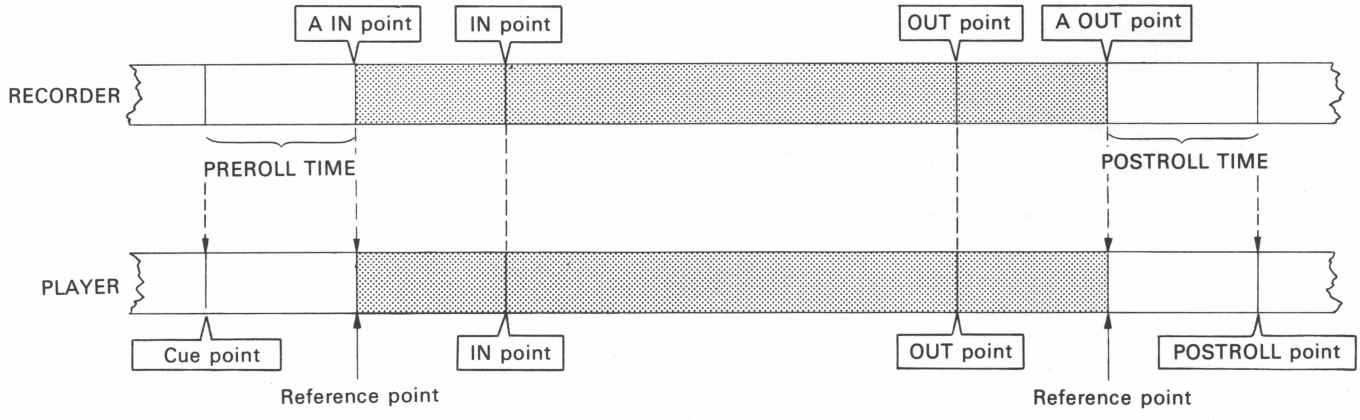
* AUDIO SPLIT mode is shown in parentheses.

1-11-6. AUDIO SPLIT Editing Area

For AUDIO SPLIT editing, the video and audio editing points are entered at different positions on the tape. In this case, the reference editing points are automatically set as follows.

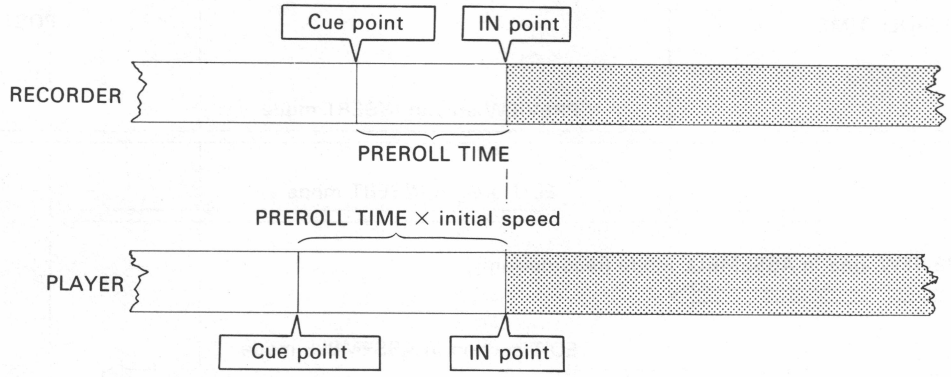


For AUDIO SPLIT editing in the INSERT mode using two VTRs, the editing points of the player are normally defined by the IN and OUT points of the video signal. In this case, the reference points on the player is decided by the reference points on the recorder as follows.



1-11-7. VAR MEMORY Mode Editing

While playing back a tape with the speed of a curve memorized in the VAR MEMORY mode, the playback picture can be recorded on the recorder (VAR MEMORY mode editing).
Refer to 1-9-6 for player operation.
Recorder operation is the same as normal editing operations.
The cue points are as follows.

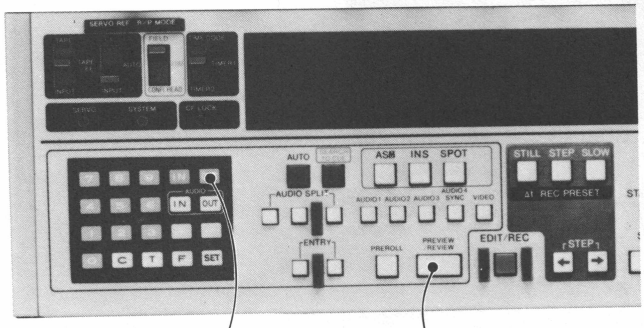


Thus, the initial speed in the VAR MEMORY mode is not necessarily the normal speed, so the player's cue point will be different from that of the recorder. This is because the player and recorder have to run at the same time at the IN point.

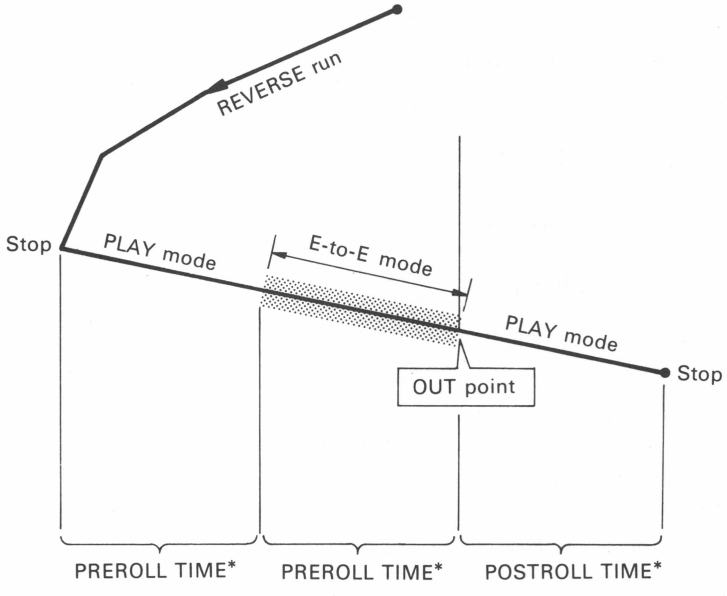
1-11-8. OUT Point PREVIEW

Editing with one VTR

If the buttons shown below are pressed when the IN and OUT points have been entered in the INSERT mode, the OUT points can be previewed.



The tape runs as shown below, and the OUT point can be monitored.



Editing with two VTRs

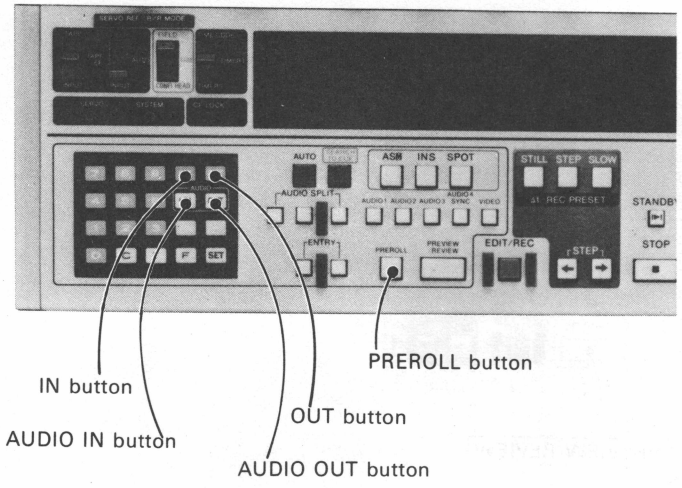
In the INSERT mode, pressing the recorder buttons as described above when both recorder and player's IN points have been entered and either recorder or player's OUT point has been entered makes the recorder and player tapes run as shown in the figure above, and the OUT point can be monitored.

- If the PREVIEW/REVIEW button is pressed and then the STOP button is pressed at any point following the IN point so as to stop PREVIEW, the IN point only can be monitored.

* The PREROLL time and the POSTROLL time can be set by the P. ROL TIME switch on the SY-79 board in one-second units from 0 to 15 seconds.

1-12. PREROLL

PREROLL operation can be performed using the following buttons.



When the AUTO button is turned off:

The IN and OUT points can be entered (lamp does not light). If operations are performed as follows when the IN and OUT points have been entered, PREROLL is possible.

- Press the PREROLL button.
  → Preroll to [IN point − preroll time] position.
- Press the PREROLL and IN buttons.
  → Preroll to IN point.
- Press the PREROLL and OUT buttons.
  → Preroll to OUT point.

When the AUTO button is turned on:

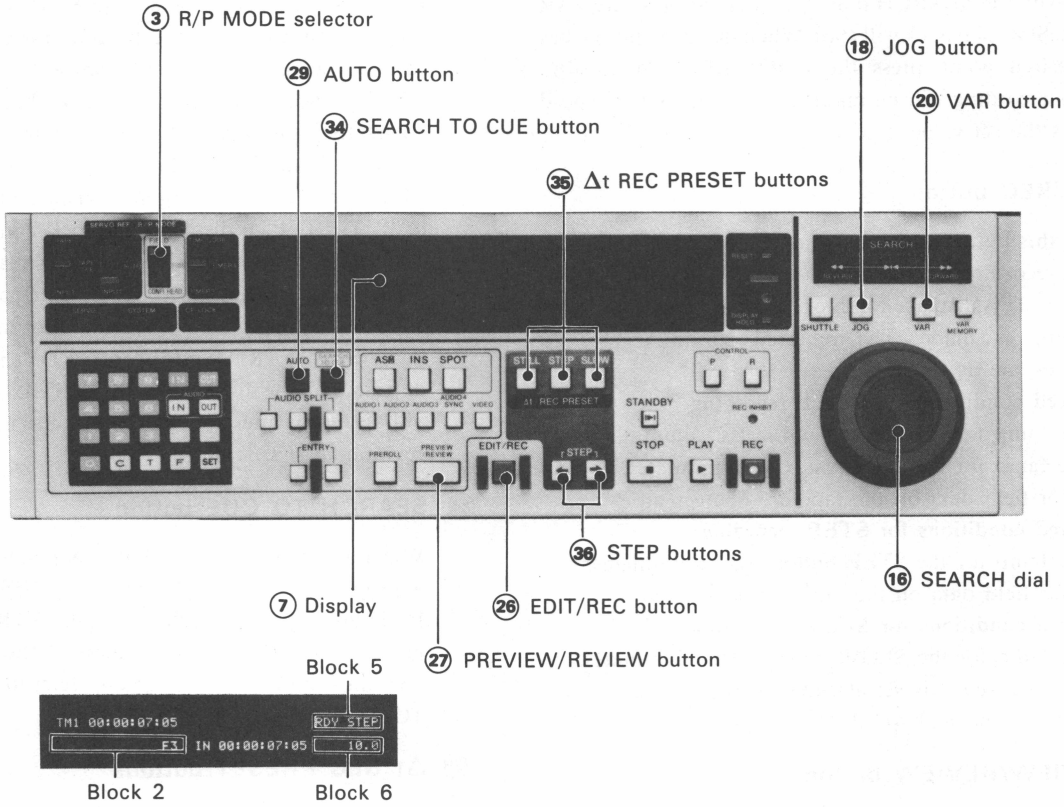
- Press the PREROLL button.
  Preroll to [IN point − preroll time] position.
- Press the PREROLL and IN buttons.
  → Preroll to IN point.
- Press the PREROLL and OUT buttons.
  → Preroll to OUT point.
- Press the PREROLL and AUDIO IN buttons.
  → Preroll to AUDIO IN point*.
- Press the PREROLL and AUDIO OUT buttons.
  → Preroll to AUDIO OUT point*.

* When AUDIO SPLIT mode is turned on.

1-13. Δt RECORDING

1-13-1. Switches and Function Buttons for Δt Recording

Of the switches and buttons described in 1-4-3 to 1-4-5, the following switches and buttons are used for Δt recording.



③ R/P MODE selector

This selector selects the unit (field or frame) of Δt recording and the unit of moving of the tape (field or frame) when the STEP buttons are pressed. For details, refer to 1-4-3.

⑦ Display

Block 2: When the tape speed is less than 4/30 of the normal speed and color field data on the tape are being read, this block shows the color field number being read. When two VTRs are used for Δt recording, this block shows the color field number for the recorder or player VTR. For details, refer to 1-4-3 ⑦ Display.

Block 5: When the Δt recording has been preset and required conditions for the Δt recording have been satisfied, this block shows "RDY STIL", "RDY STEP" or "RDY ×/××". For details, refer to 1-4-3 ⑦ Display.

Block 6: During STEP recording, this block shows the number of times of STEP recording performed by frames. For details, refer to 1-4-3 ⑦ Display.

⑯ SEARCH dial

During STILL and STEP recordings, use this dial together with the JOG, SHUTTLE or VAR button to search for the point where the STILL or STEP recording is to be made if you do not know the time data of that point.
During SLOW recording, the SEARCH dial is used to set the tape speed.

⑱ JOG button

This button is used together with the SEARCH dial ⑯ to search for a point on the tape where a STILL or STEP recording is to be made. (Refer to ⑯ SEARCH dial described above.) During STEP recording, the lamp for this button illuminates while the tape is moving.

⑳ VAR button

This button is used for slow playback in the PROGRAM JOG mode to search for a point where SLOW recording is to be made. (1) Press the SLOW button ㊱ to select the SLOW recording mode, (2) select the unit of SLOW recording with the R/P MODE selector ③, (3) set the tape speed with the SEARCH dial ⑯, then (4) press the VAR button. Slow playback will start. When the tape approaches the desired point, press the EDIT/ REC button ㉖. SLOW recording will be made as soon as the tape speed reaches the set value.

㉖ EDIT/REC button

When this button is pressed with the required conditions for Δt recording satisfied ("RDY STIL", "RDY STEP" or "RDY ×/××" is displayed in block 5 on the display ⑦), Δt recording is made. The required conditions for Δt recording are as follows:

Required conditions for STILL recording

- The lamp for the STILL button ㉟ illuminates.
- The lamp for the ➡ button ㊱ illuminates.
- Color field data on the tape are being read.

Required conditions for STEP recording

- The lamp for the STEP button ㉟ illuminates.
- Color field data on the tape are being read.

Required conditions for SLOW recording

- The lamp for the SLOW button ㉟ illuminates.
- The tape speed is set at either of 1/60, 1/30, 2/30, 3/30 or 4/30 of the normal speed.

㉗ PREVIEW/REVIEW button

This button is used to perform preview operation in STILL and STEP recordings. When, at the desired point for STILL or STEP recording, the required conditions for the recording are satisfied and "RDY STIL" or "RDY STEP" is displayed in block 5 on the display ⑦, press the PREVIEW/REVIEW button (in STEP recording, press the ⬅ button ㊱ once before pressing the PREVIEW/REVIEW button). The VTR will enter the PREVIEW mode, and the E-to-E mode picture and the playback picture will be displayed alternately field by field on the monitor. (Note that for this type of monitoring, the S2 switch on the DT-04 board must be set to FIELD, or the S2 switch on the DT-04 board must be set to REM and the R/P MODE selector ③ to FIELD.) The ratio of the E-to-E mode picture to the playback picture can be set to a certain value from 1/32 to 8/32 (of the 32 fields, the value of the numerator indicates the number of fields of the E-to-E mode picture) with the EE/PB MULTI switch on the LG-04 board. For details, refer to " ㉟ Δt REC PRESET buttons" in 1-4-5.

㉙ AUTO button

This button is used to satisfy the required conditions for STILL or STEP recording when "RDY STIL" or "RDY STEP" is not displayed in block 5 on the display ⑦ after the desired point for the recording has been searched with the SEARCH dial ⑯, JOG button ⑱, ⬅ button ㊱ and/or ➡ button ㊱. When the AUTO button is pressed, the tape runs in the reverse direction for a while, then runs in the forward direction and stops at the point where the AUTO button has been pressed. At that point, the VTR enters the still mode (the lamp of the ➡ button ㊱ remains illuminated). Thus, the required conditions for STILL or STEP recording are satisfied, and "RDY STIL" or "RDY STEP" is displayed in block 5 on the display ⑦. The AUTO button is also used to satisfy the required conditions for STILL or STEP recording again if the next operational step has not been performed for about 5 minutes after "RDY STIL" or "RDY STEP" has first appeared on the display ⑦. "RDY STIL" or "RDY STEP" will disappear after about 5 minutes has passed if the next operational step is not performed.

㉞ SEARCH TO CUE button

When this button is pressed, the IN point entered with the appropriate keys of the 20-key section ㉝ or the ENTRY IN button ㉚ is searched and the VTR enters the still mode at the IN point (the lamp of the ➡ button ㊱ remains illuminated). For details, refer to " ㉞ SEARCH TO CUE button" in 1-4-5.

㉟ Δt REC PRESET buttons

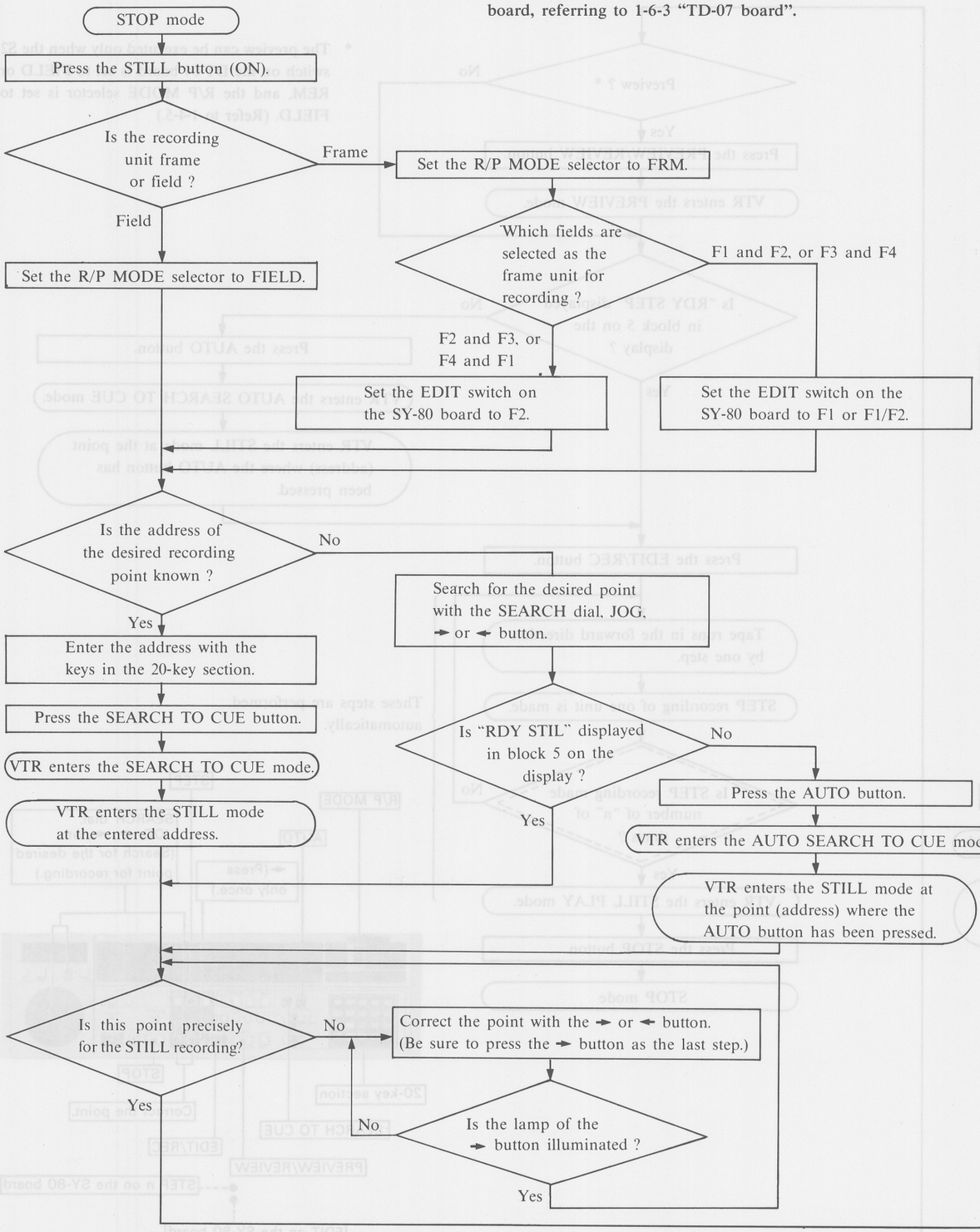
These buttons are used to select the Δt recording mode (STILL, STEP or SLOW recording). For details, refer to " ㉟ Δt REC PRESET buttons" in 1-4-5.

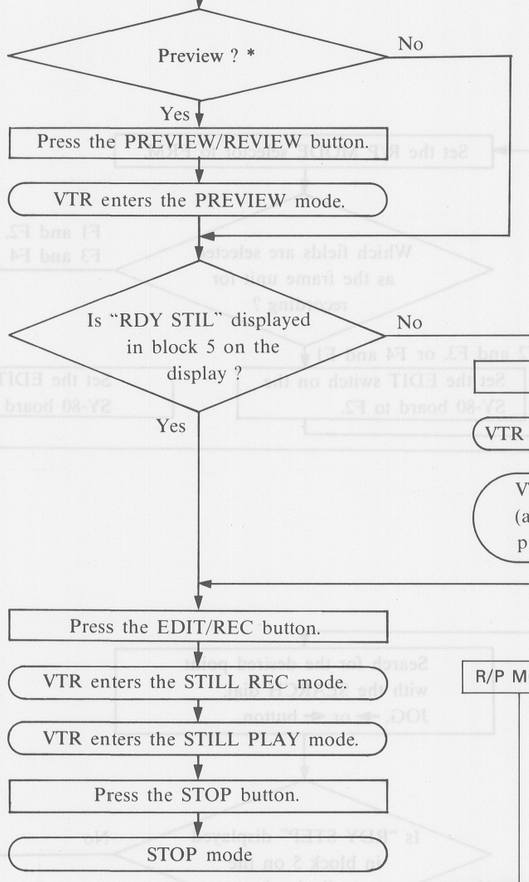
㊱ STEP buttons

Each time these buttons are pressed, the tape runs in the forward (➡ button) or reverse (⬅ button) direction by one step. For details, refer to " ㊱ STEP buttons" in 1-4-5.

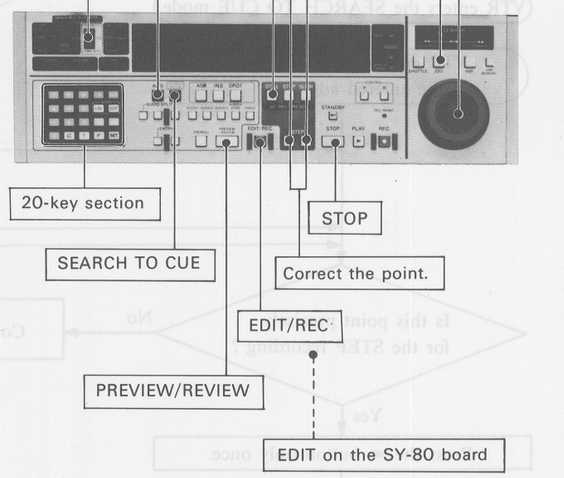
1-13-2. STILL Recording

Before making a recording, be sure to adjust the height of the R/P video head with the RV1 control on the TD-07 board, referring to 1-6-3 "TD-07 board".



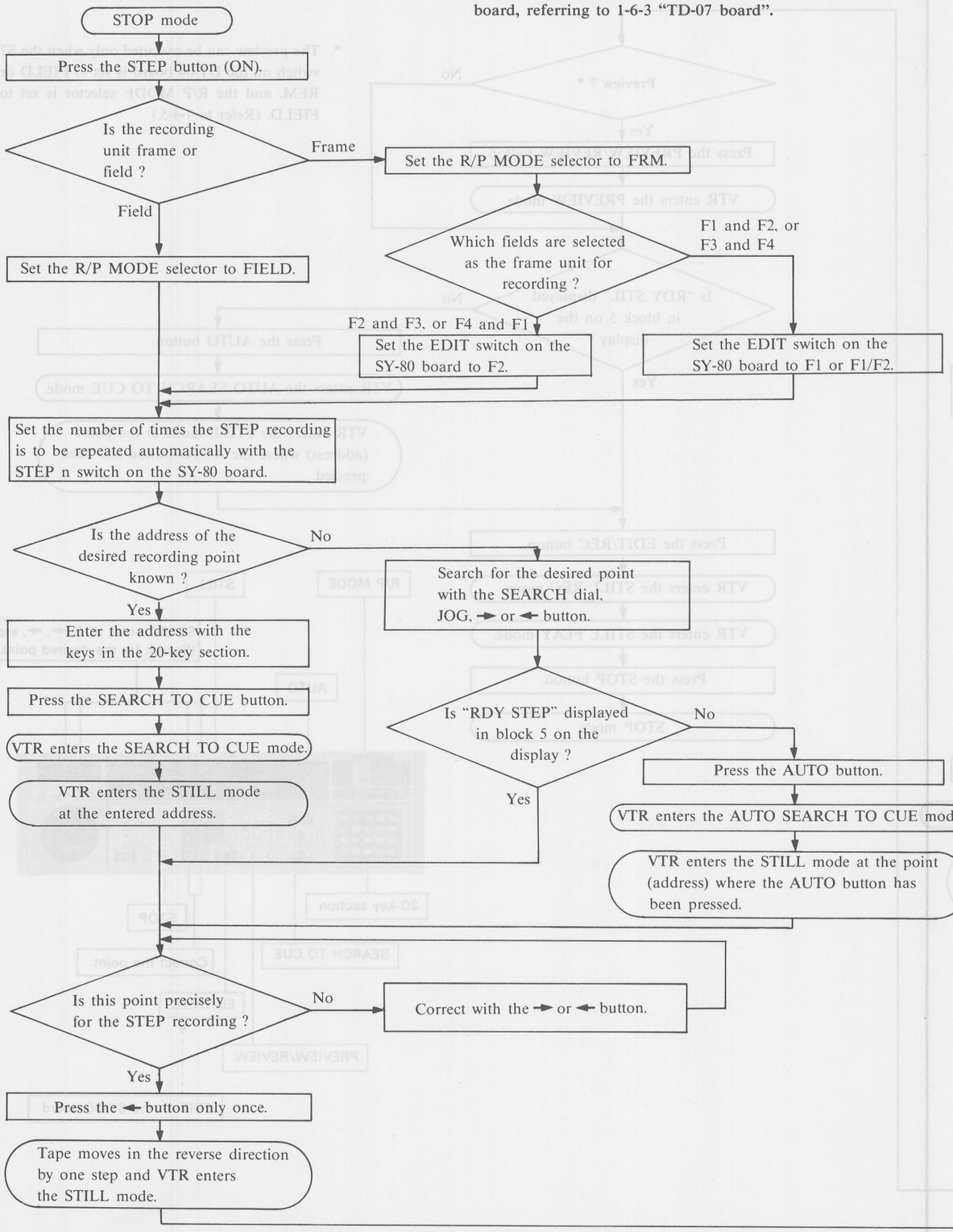


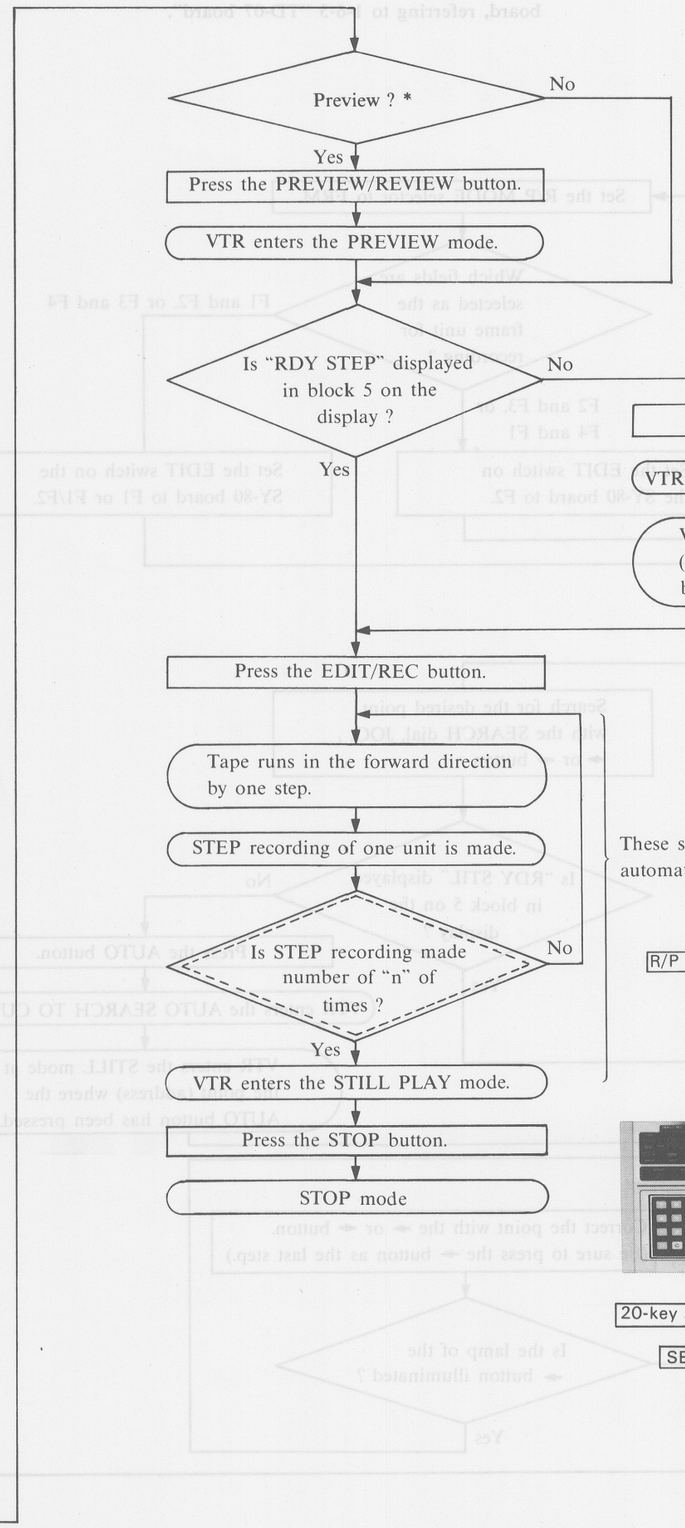
* The preview can be executed only when the S2 switch on the DT-04 board is set to FIELD or REM, and the R/P MODE selector is set to FIELD. (Refer to 1-4-5.)



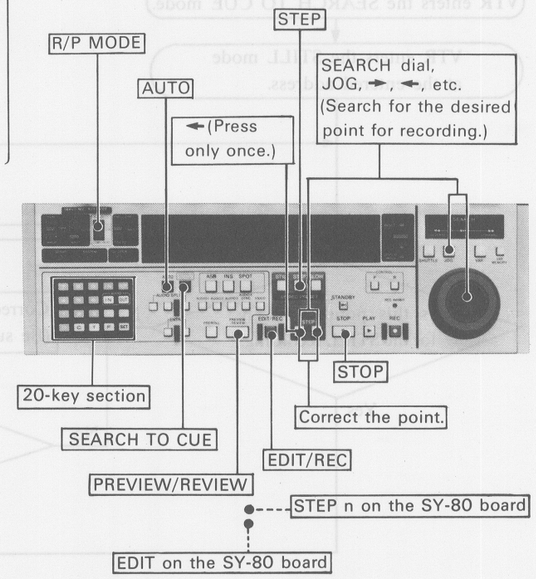
1-13-3. STEP Recording

Before making a recording, be sure to adjust the height of the R/P video head with the RV1 control on the TD-07 board, referring to 1-6-3 "TD-07 board".



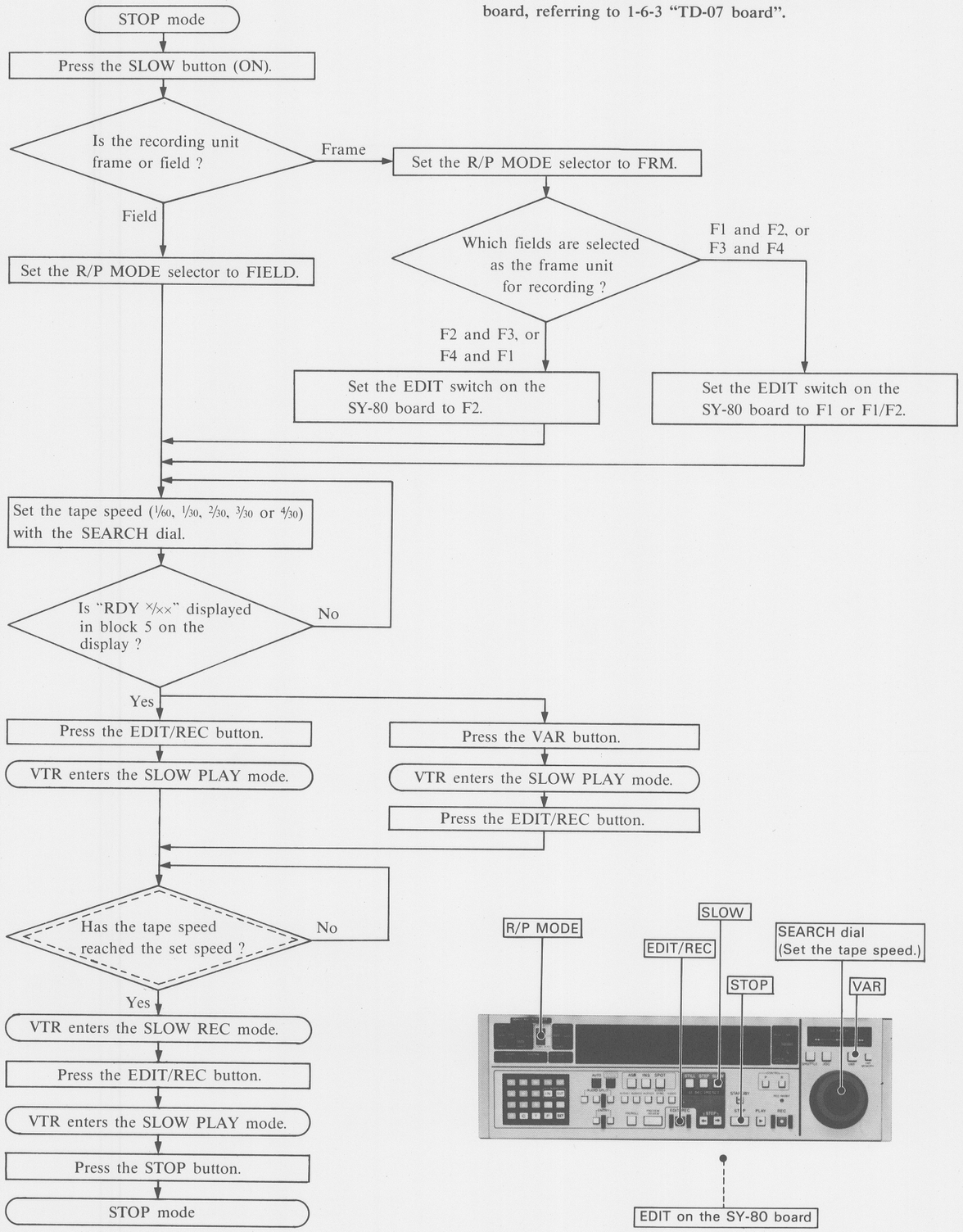


* The preview can be executed only when the S2 switch on the DT-04 board is set to FIELD or REM, and the R/P MODE selector is set to FIELD. (Refer to 1-4-5.)



1-13-4. SLOW Recording

Before making a recording, be sure to adjust the height of the R/P video head with the RV1 control on the TD-07 board, referring to 1-6-3 "TD-07 board".



1-14. ALARM

If one of the VTRs malfunctions, the respective alarm lamp lights or blinks and a buzzer sounds. Refer to the table below.

○: ON ◒: Blinking —: OFF

	STOP lamp	STANDBY lamp	SERVO ALARM	SYSTEM ALARM	Buzzer	VTR operation
VTR malfunction	—	—	○	○	SOUND	STOP
Drum UNLOCK*	—	—	○	—	—	CONTINUE
Capstan UNLOCK	—	—	○	—	—	CONTINUE
Movable guide malfunction (tape guide)	—	—	—	○	SOUND	STOP
Tape out (disengaged)	—	—	—	—	—	STOP
Power supply overheat	—	—	—	○	SOUND	CONTINUE
Tape sticking	—	◒	—	○	SOUND	STOP
No servo reference signal	◒	—	—	—	—	CONTINUE

* If the drum is unlocked for more than 15 seconds, the STANDBY lamp blinks, the SYSTEM ALARM lamp lights and the buzzer sounds — the same condition as tape sticking.

- In addition to these, various error messages are displayed on on the display. (Refer to ⑦ in 1-4-3.)
- The sound volume of the buzzer can be adjusted with the RV3 and RV4 controls on the DP-37 board.

1-13-4. SLOW Recording

Before making a recording, be sure to adjust the height of the R/P video head with the RV1 control on the TD-07 board, referring to 1-6-3 "TD-07 board".

1-14. ALARM

If one of the VTR's malfunctions, the respective alarm lamp lights or blinks and a buzzer sounds. Refer to the table below.

○: ON ◒: Blinking —: OFF

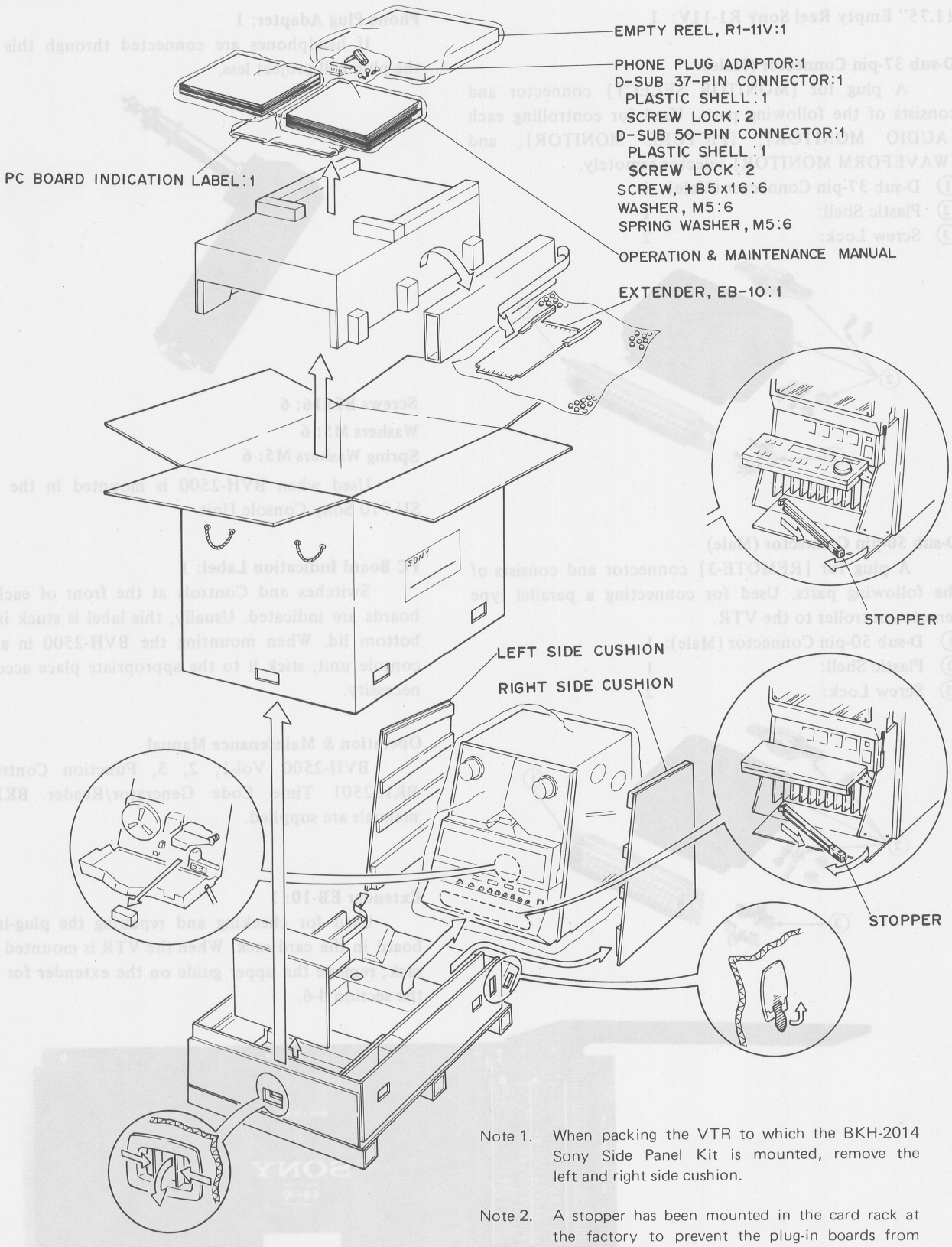
	STOP lamp	STANDBY lamp	SERVO ALARM	SYSTEM ALARM	Buzzer	VTR operation
VTR malfunction	—	—	○	○	SOUND	STOP
Drum UNLOCK*	—	—	○	—	—	CONTINUE
Capstan UNLOCK	—	—	○	—	—	CONTINUE
Movable guide malfunction (tape guide)	—	—	—	○	SOUND	STOP
Tape out (disengaged)	—	—	—	—	—	STOP
Power supply overheat	—	—	—	○	SOUND	CONTINUE
Tape sticking	—	◒	—	○	SOUND	STOP
No servo reference signal	◒	—	—	—	—	CONTINUE

* If the drum is unlocked for more than 15 seconds, the STANDBY lamp blinks, the SYSTEM ALARM lamp lights and the buzzer sounds — the same condition as tape sticking.

- In addition to these, various error messages are displayed on the display. (Refer to ⑦ in 1-4-3.)
- The sound volume of the buzzer can be adjusted with the RV3 and RV4 controls on the DP-37 board.

SECTION 2
INSTALLATION

2-1. UNPACKING AND REPACKING



Note 1. When packing the VTR to which the BKH-2014 Sony Side Panel Kit is mounted, remove the left and right side cushion.

Note 2. A stopper has been mounted in the card rack at the factory to prevent the plug-in boards from comming off in transit.
Usually, the stopper is not necessary, however, it should be mounted again when transporting to a distance place.

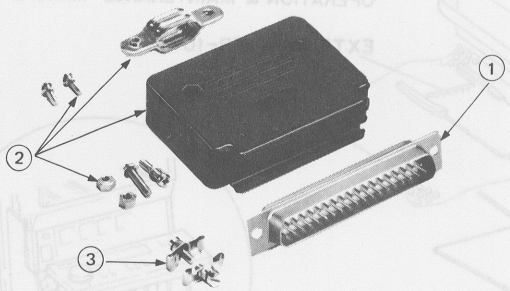
2-2. ACCESSORIES SUPPLIED

11.75" Empty Reel Sony R1-11V: 1

D-sub 37-pin Connector (Male)

A plug for [MONITOR SELECT] connector and consists of the following parts. Used for controlling each [AUDIO MONITOR], [PICTURE MONITOR], and [WAVEFORM MONITOR] selector remotely.

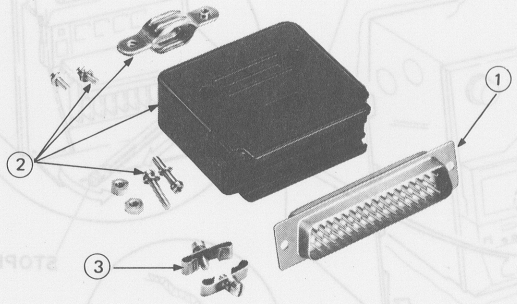
① D-sub 37-pin Connector (Male): 1
② Plastic Shell: 1
③ Screw Lock: 2



D-sub 50-pin Connector (Male)

A plug for [REMOTE-3] connector and consists of the following parts. Used for connecting a parallel type remote controller to the VTR.

① D-sub 50-pin Connector (Male): 1
② Plastic Shell: 1
③ Screw Lock: 2



Phone Plug Adapter: 1

If headphones are connected through this adapter, the plug will project less.

Screws B5x16: 6
Washers M5: 6
Spring Washers M5: 6

Used when BVH-2500 is mounted in the SU-900/ SU-910 Sony Console Unit.

PC Board Indication Label: 1

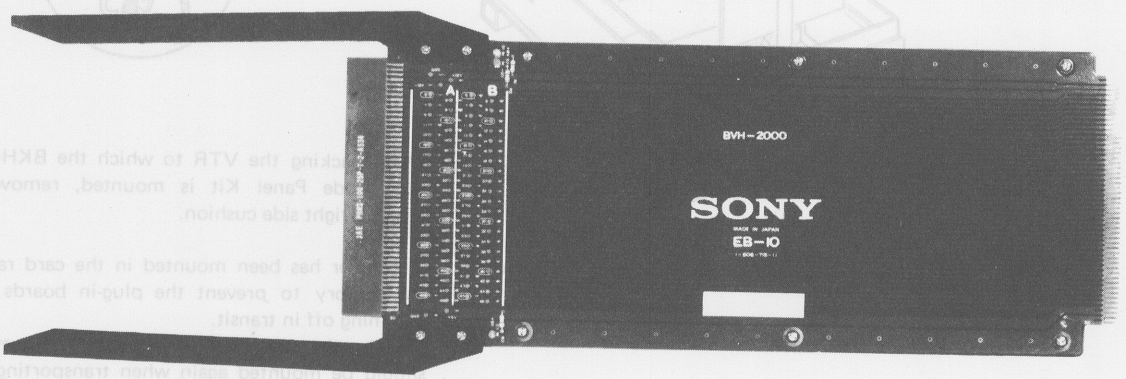
Switches and Controls at the front of each plug-in boards are indicated. Usually, this label is stuck inside the bottom lid. When mounting the BVH-2500 in a rack or console unit, stick it to the appropriate place according as necessity.

Operation & Maintenance Manual

BVH-2500 Vol-1, 2, 3, Function Control Panel BKH-2501 Time Code Generator/Reader BKH-2015A manuals are supplied.

Extender EB-10: 1

Used for checking and repairing the plug-in circuit board in the card rack. When the VTR is mounted in a 19" rack, remove the upper guide on the extender for use. See the section 4-6.



2-3. MATCHING CONNECTORS AND CABLES

BVH-2500 Connectors		Matching Connectors/Cables	
Used for	**Type**	**Type**	**Sony Part No.**
REMOTE connector panel			
REMOTE-1	D-sub, 15-pin, Female	CVK-1 Cable Assy	1-560-409-00 (Note 1)
AUX	D-sub, 15-pin, Male		(Note 2)
REMOTE-2 IN, OUT	D-sub, 9-pin, Female	D-sub, 9-pin, Male	1-508-158-XX
		RCC-5G Cable Assy	Optional Accessory (Note 3)
		RCC-10G Cable Assy	Optional Accessory (Note 3)
		RCC-30G Cable Assy	Optional Accessory (Note 3)
REMOTE-3	D-sub, 50-pin, Female	D-sub, 50-pin, Male	1-560-772-00 (Note 4)
MONITOR SELECT	D-sub, 37-pin, Female	D-sub, 37-pin, Male	1-560-771-00 (Note 5)
		MS Flat Cable Assy	1-933-306-00 (Note 6)
VIDEO Connector Panel			
TO TBC	Round, 18-pin, Female	CCY Cable Assy	1-551-807-00 (Note 7)
Others	BNC	BNC	
AUDIO Connector Panel			
AUDIO-1, 2, 3 INPUT	XLR, 3-pin, Female	XLR, 3-pin, Male	1-508-084-00 (Note 8)
AUDIO-1, 2, 3 OUTPUT	XLR, 3-pin, Male	XLR, 3-pin, Female	1-508-083-00 (Note 9)
MIC INPUT	6ϕ Phone Jack	6ϕ Phone Plug	
Level Control Panel			
HEADPHONES	6ϕ Phone Jack	6ϕ Phone Plug	

(Note 1) CVK-1 Cable Assy 1-556-409-00
One cable (40 cm in length) is supplied to BKH-2016 Sony CCJ Converter.

(Note 2) REMOTE AUX Connector
Not used in BVH-2500.

(Note 3) RCC-5G/10G/30G Cable Assy
Used for connecting the BVH-2000/2500 or BVU-800/820 to the BVH-2500.
The length of the cables are 5 m, 10 m and 30 m.
The BVU-800/820 has the RCC-5G as an accessory.

(Note 4) D-sub 50-pin Male Connector 1-560-772-00

(Note 5) D-sub 37-pin Male Connector 1-560-771-00
Each one connector is supplied to BVH-2500.

(Note 6) MS Flat Cable Assy 1-933-306-00
SUA-901/SUA-911 Sony Monitor Console is equipped with one cable, 1.7 or 1.85 m in length.

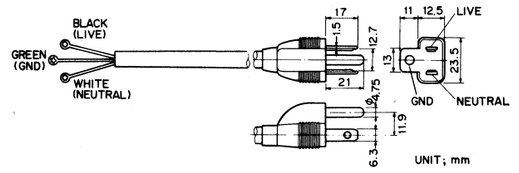
(Note 7) CCY Cable Assy 1-551-807-00
One cable (3 m in length) is supplied to BVT-2000 Sony Time Base Corrector.

(Note 8) XLR 3-pin Male Connector 1-508-084-00
Equivalent to CANNON XLR-3-12C.

(Note 9) XLR 3-pin Female Connector 1-508-083-00
Equivalent to CANNON XLR-3-11C.

2-4. POWER REQUIREMENTS

Power Line Voltage	AC 90 to 132V
Power Line Frequency	50/60 Hz
Power Consumption	550W max.
	Note 1. In the worst case, approx. 10A input current will flow and the surge currents will be three or four times as much.
Power Cord	Approx. 2.4 m in length



2-5. INSTALLATION CONDITIONS

Operating Temperature	+5°C to +40°C
Storage Temperature	−20°C to +60°C
Humidity	10% to 90% (noncondensing)

Mount on a flat, stable base.

The BVH-2500 total weight is 73 kg, including the BKH-2014 Side Panel Kit.

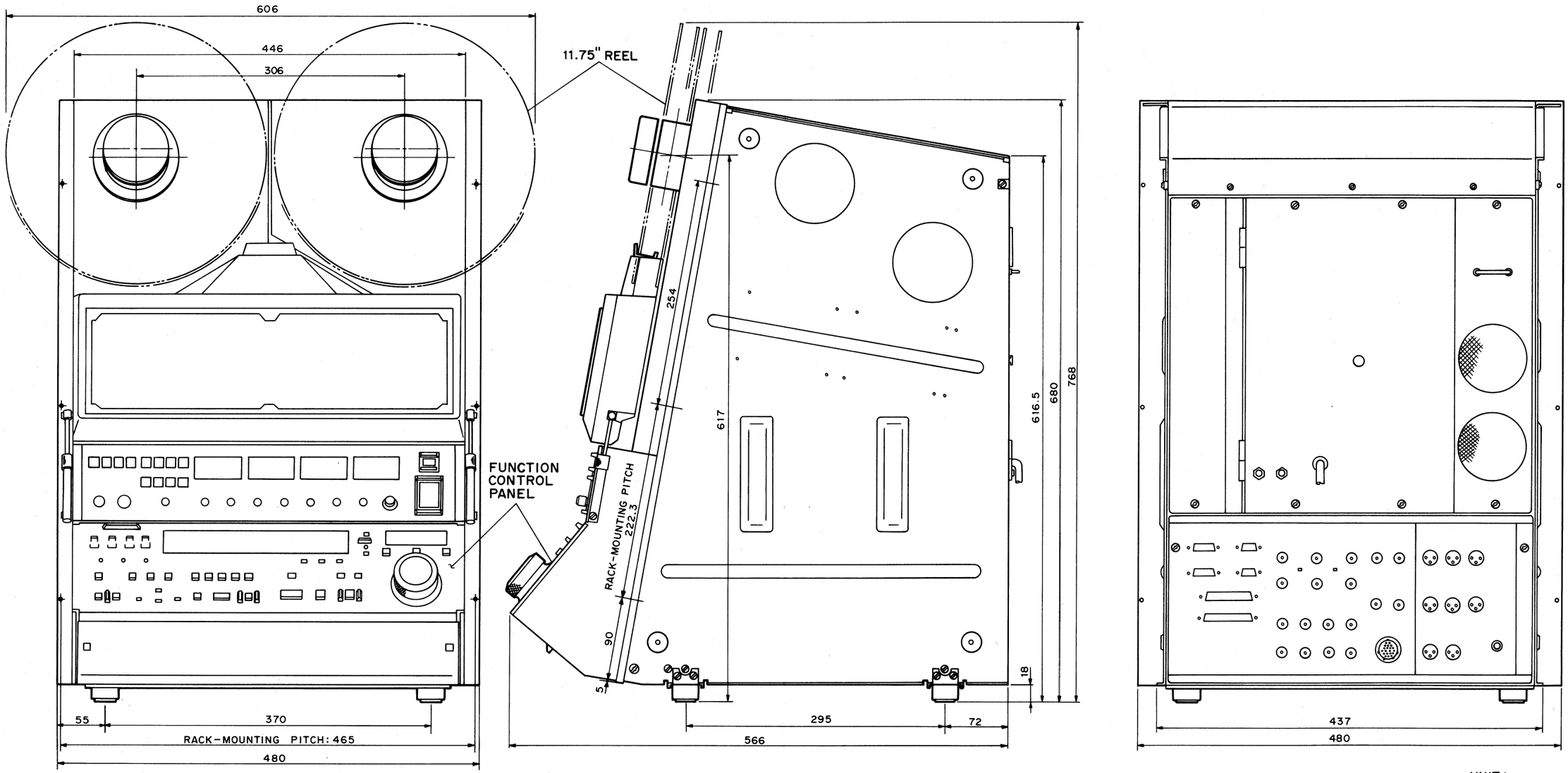
The total weight of the SU-900 or SU-910 Console Unit is approx. 300 kg including the BVH-2500, the BVT-2000 and monitors etc.

Do not install in the following types of location.

- Places exposed directly to sun light or powerful light
- Dusty places
- Places subjected to vibration
- Places exposed to strong electric or magnetic fields

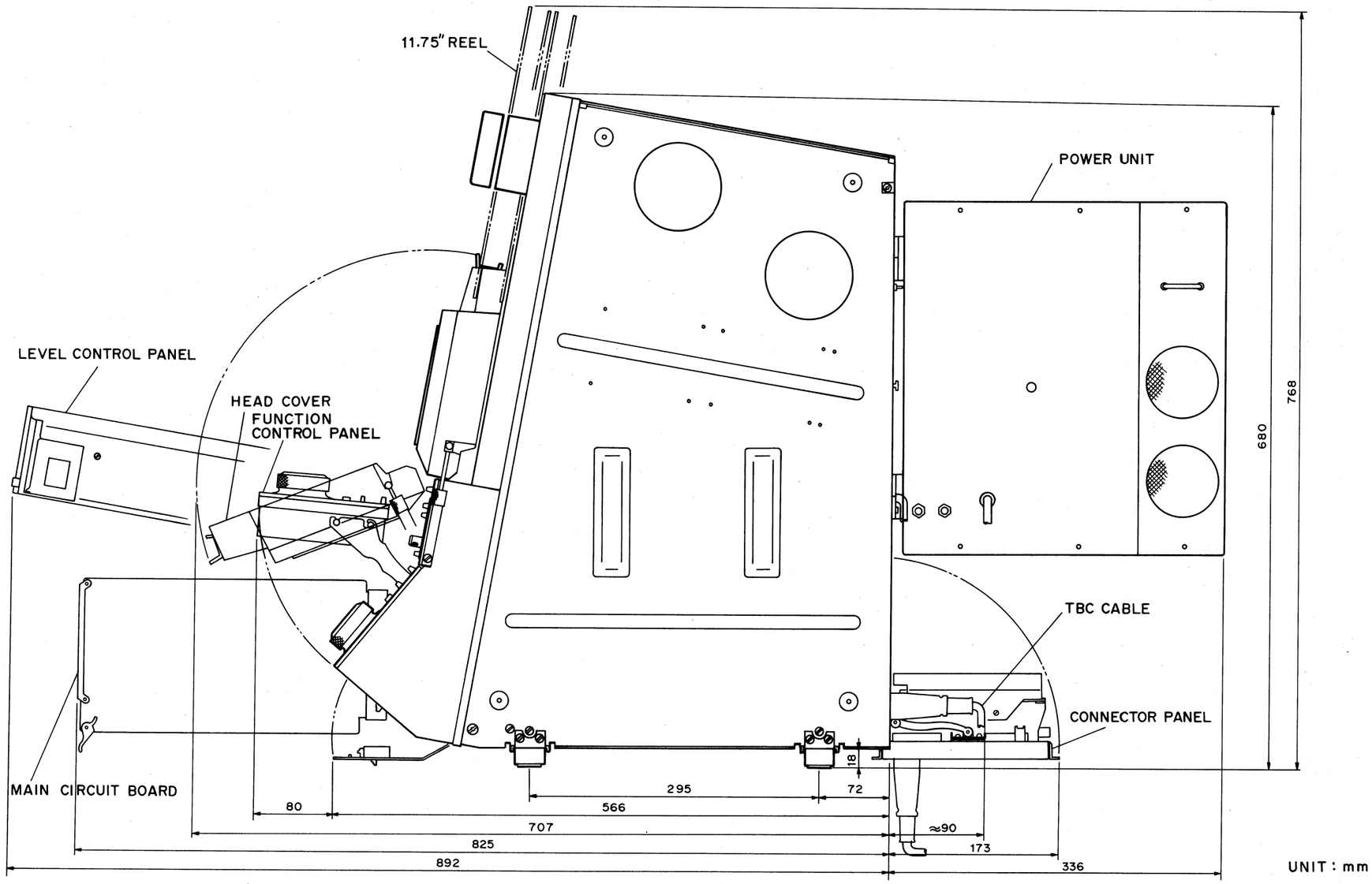
2-6. INSTALLATION SPACE

External Dimensions

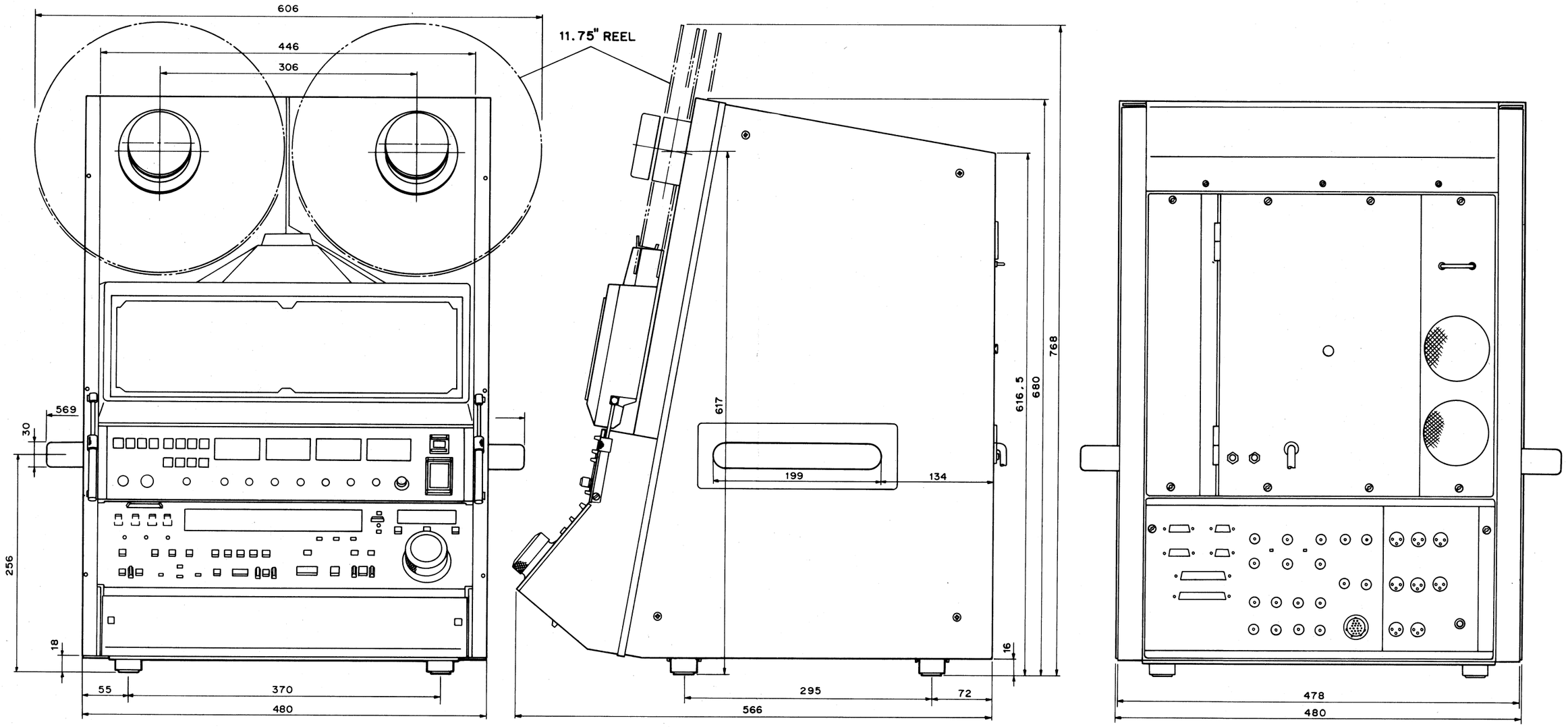


UNIT : mm

Working Space

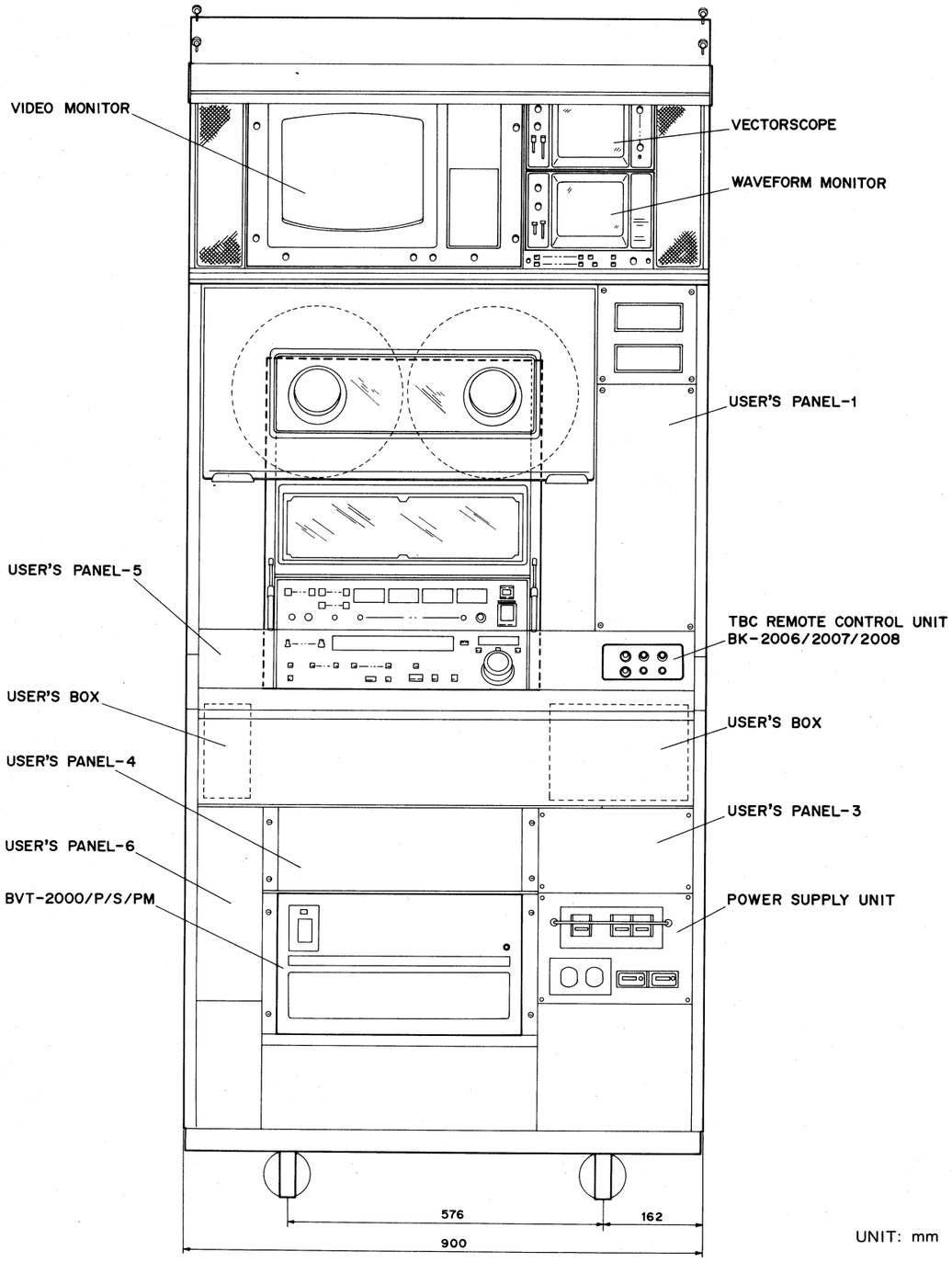


External Dimensions: When mounting BKH-2014

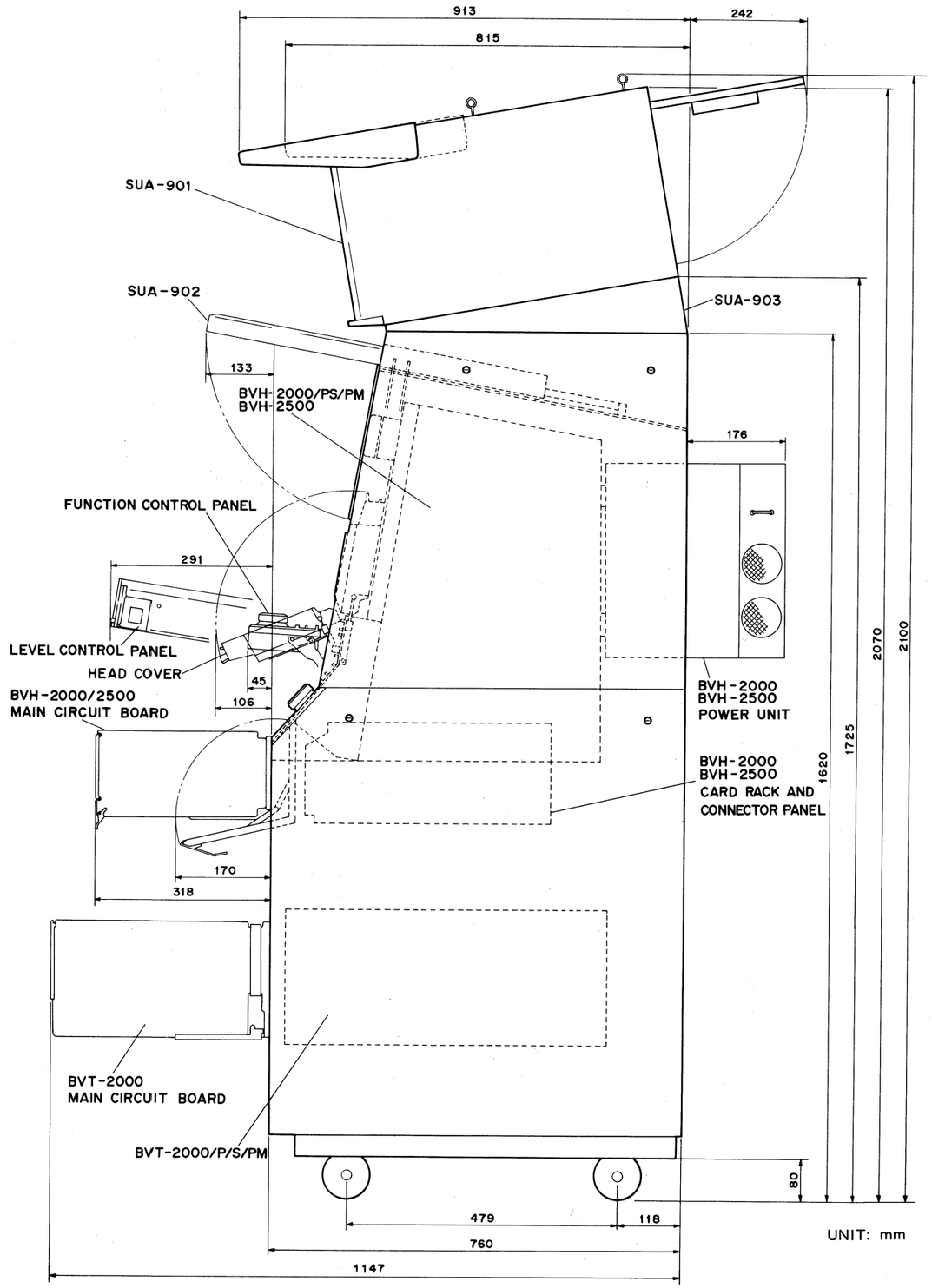


UNIT : mm

External Dimensions/Working Space: When mounting to SU-900

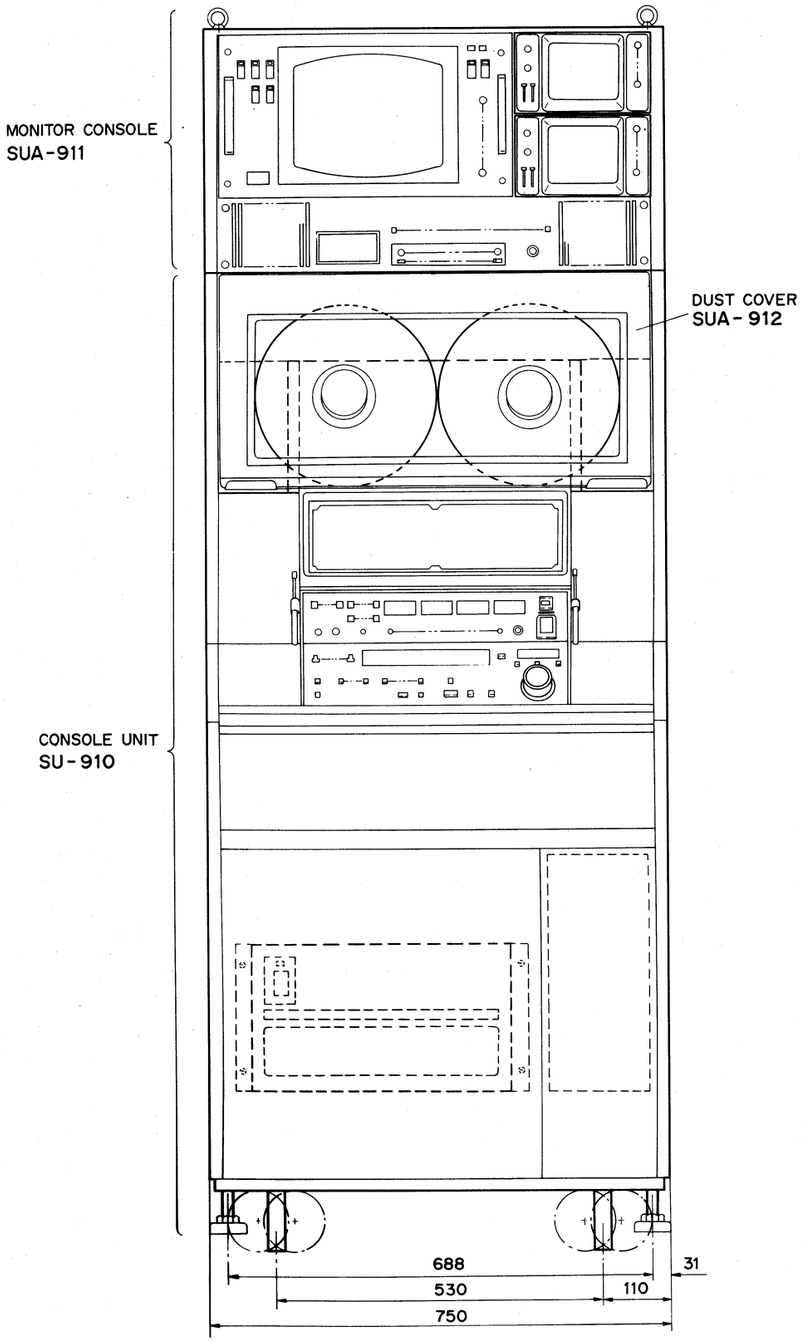


UNIT: mm

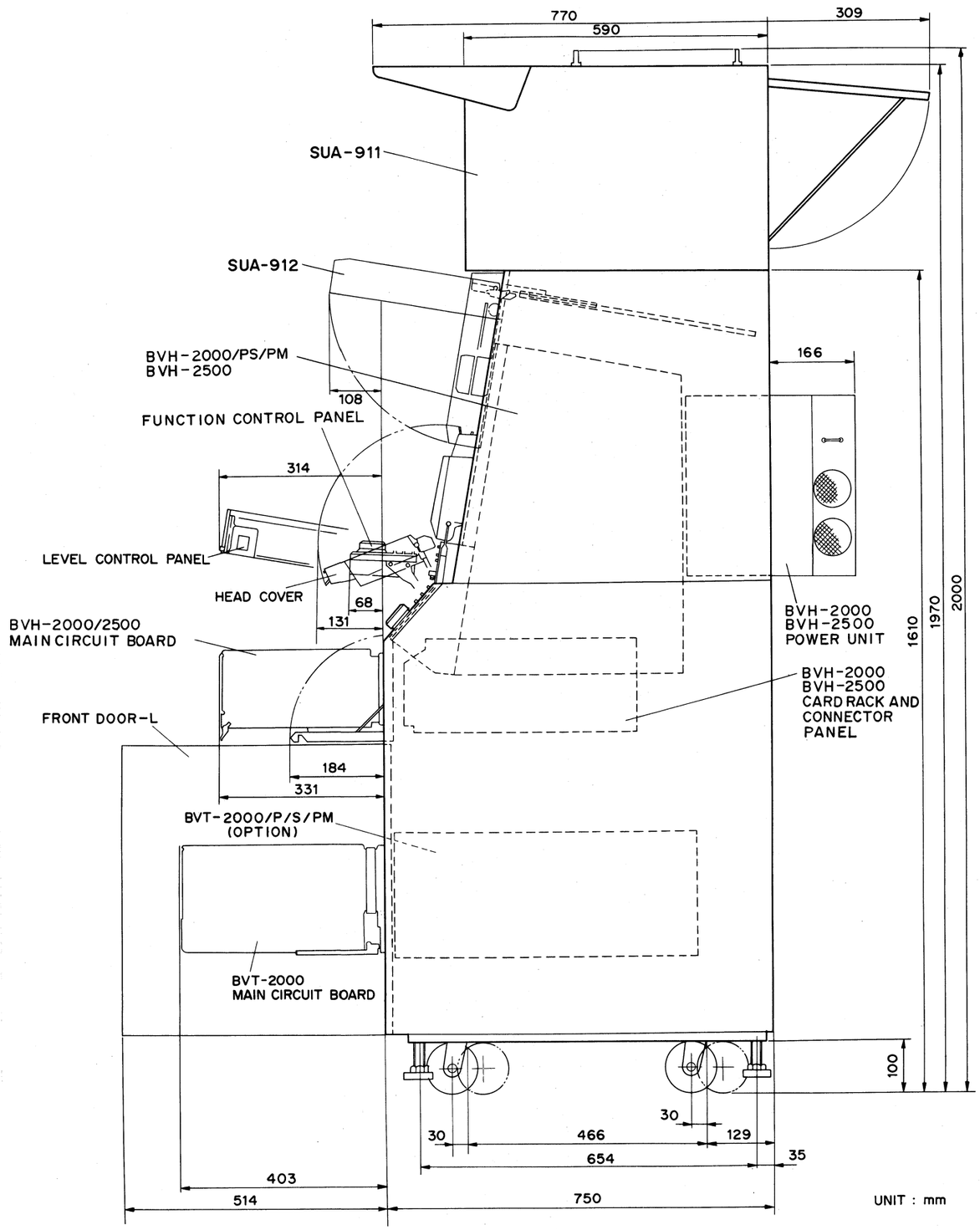


UNIT: mm

External Dimensions/Working Space: When mounting to SU-910

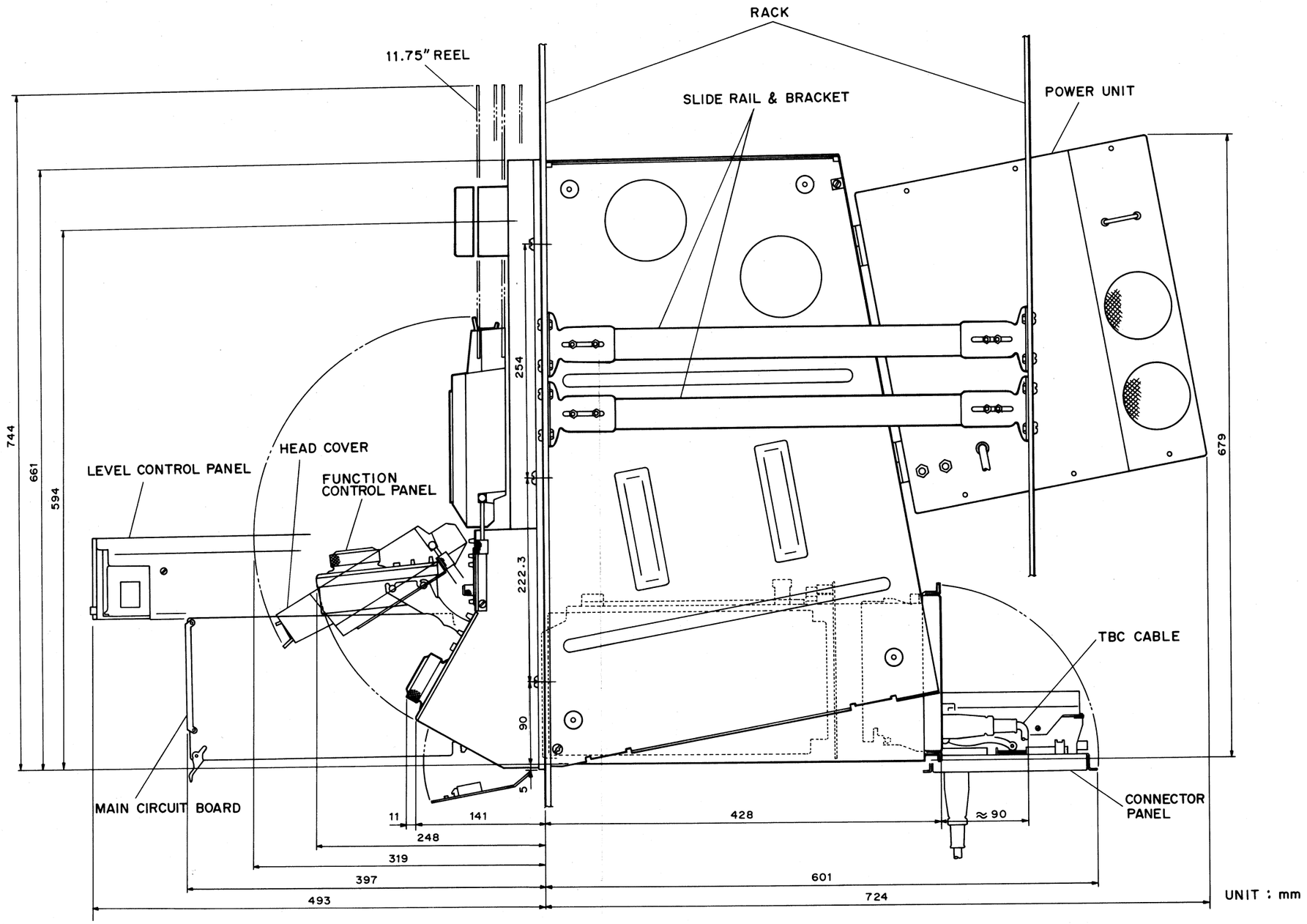


2-12(2/3)



2-12(3/3)

External Dimensions/Working Space: When rack-mounting

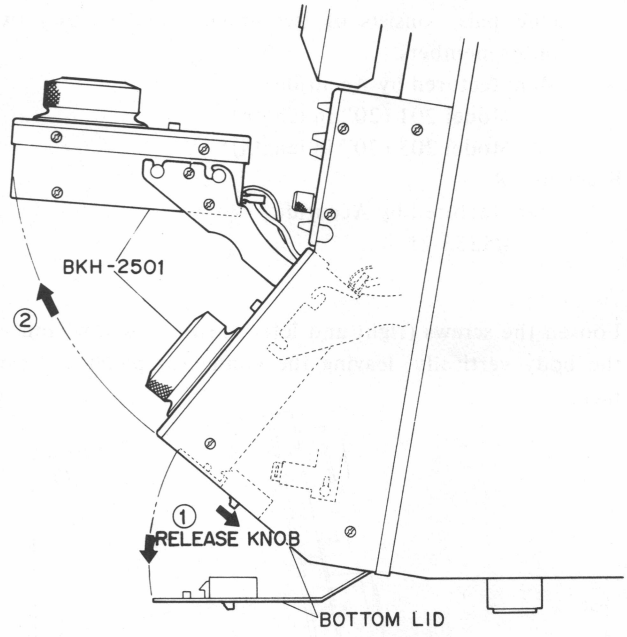


2-7. OPENING/CLOSING FUNCTION CONTROL PANEL BKH-2501

Opening

① Slide the release knobs (on the right and left) in the direction indicated by the arrow to open the bottom lid.

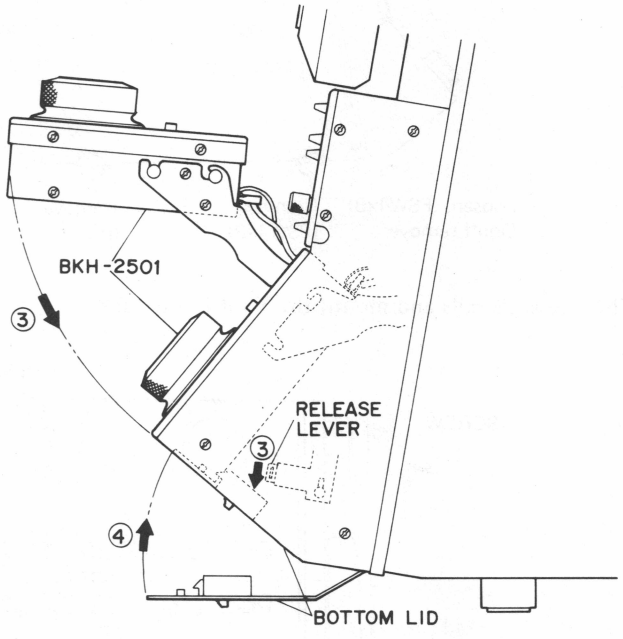
② Pull the function control panel BKH-2501 up.



Closing

③ Push the BKH down while depressing the release lever, that is inside the left side panel of the VTR.

④ Close the bottom lid.



2-8. MOUNTING ON THE SU-900/SU-910 CONSOLE UNIT

Refer to the SU-900/SU-910 installation manual.

2-9. RACK MOUNTING

Prepare the following parts for rack-mounting.

Slide Rails: 2 pairs
One pair consists of two inner members and two outer members.
Manufactured by Accuride
Model 201 (20" in length)*
or Model 203 (20" in length)*

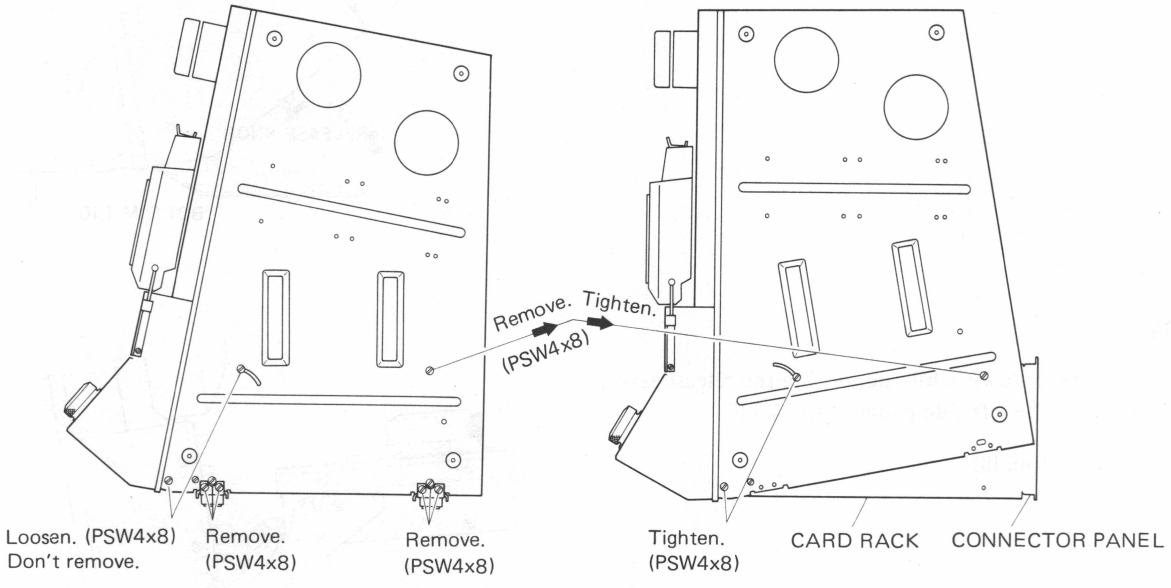
Brackets: 8
Manufactured by Accuride
#5355-2*

Inner Member Fixing Screws: 12
+B4x8 (Sony part No. 7-682-561-04)

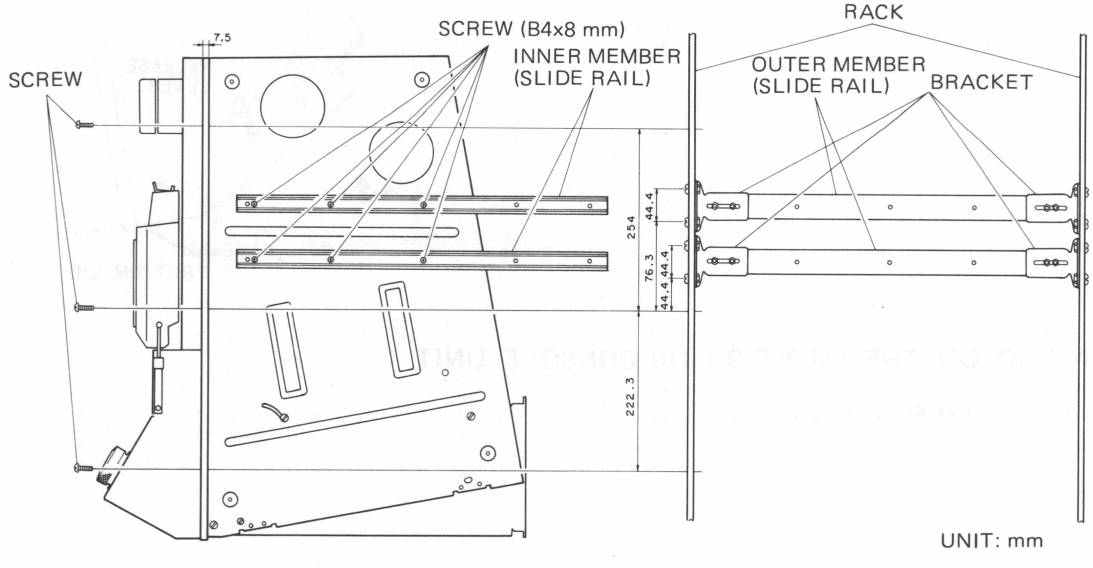
Other Screws and Nuts
Be sure to use the parts recommended by the slide rail manufacturer.

* Accuride slide rail Model 305 (20") and Bracket #5356 can be used also.

Loosen the screws (right and left) as shown below, and set the body vertically, leaving the connector panel and card rack.



Fit the slide rails and mount the VTR in the rack.



2-10. BVT-2000 MODIFICATION

When using Sony BVT-2000 Digital Time Base Corrector in combination with BVH-2000 or BVH-2500, the TBC should be modified as follows.

(1) Picture Stability at Mode Switching

Applicable to BVT-2000 #10001 to #11699

When the operating mode of BVH-2000/2500 is switched to Normal Play in the following sequence:

Normal Play ⟶ DT Play ⟶ Normal Play

the picture on the monitor screen may shift even though the color framing servo function is operative.

Modification Procedure A

Replace the SQ-3 board as follows.

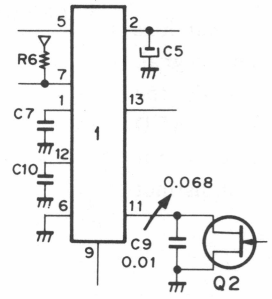
PWA No. A-6259-069-A (PWB No. 1-600-166-11, 12, 13, 14 or 21) ⟶ A-6259-069-B (1-600-166-22 & above)

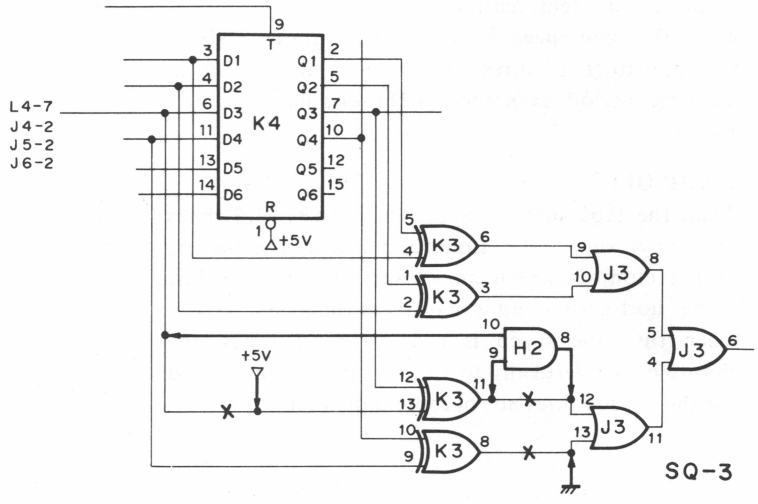
Modification Procedure B

SQ-3 board (PWB No. 1-600-166-11, 12, 13, 14 or 21): Modify the SQ-3 board as follows.

Replace C9 located at address O1.
C9 0.01μF 5% 50V ⟶ mylar 0.068μF 5% 50V 1-108-599-00

IC-J3 pin 12 — ✕ Break the foil. (component side) — IC-K3 pin 11
IC-J3 pin 13 — ✕ Break the foil. (solder side) — IC-K3 pin 8
IC-K4 pin 6 — ✕ Break the foil. (solder side) — IC-K3 pin 13
Add a jumper. ⟶ IC-H2 pin 10
IC-K3 pin 11 ⟷ Add a jumper. ⟷ IC-H2 pin 9
IC-J3 pin 12 ⟷ Add a jumper. ⟷ IC-H2 pin 8
IC-J3 pin 13 ⟷ Add a jumper. ⟷ IC-J3 pin 7 (GND)
IC-K3 pin 14 (+5V) ⟷ Add a jumper. ⟷ IC-K3 pin 13





(2) Picture Quality in DT Mode and Y ADD ON/OFF Switch

Applicable to BVT-2000 #10001 to #52899

The vertical movement of the chrominance signal in DT play mode is reduced by this modification.

The Y ADD ON/OFF switch determines the Y signal addition in the DT or Bidirex mode.
In the normal play mode, the Y ADD ON/OFF switch does not affect the operation of the TBC.
Since the picture characteristics of the TBC output are different between Y ADD ON and OFF in the DT or Bidirex mode as follows, select the appropriate position according to the tape speed and/or the contents of the picture.

When the VTR is in the DT or Bidirex mode, the following two status appears alternately in the short period if the tape speed is +/−1.5 times and above or +/−0.5 times and below or in the long period if the tape speed is near to +/−1 times.

Status A: The field of the VTR playback signal coincides with that of the TBC reference signal. In this case, Y ADD function does not work regardless of the Y ADD switch position.

Status B: The field of the VTR playback signal does not coincide with that of the TBC reference signal. In this case, if the Y ADD switch is set to ON, the VTR playback signal is processed by the Y ADD function and the vertical resolution of the TBC output signal is reduced by half. It results in an indistinct picture.

Y ADD ON

When the tape speed is approximately +/−1.5 times and above or +/−0.5 times and below, the vertical movement of the lines is smoothed and the TBC output picture feels natural.
When the tape speed is near to +/−1 times, distinct and indistinct pictures may appear alternately in the long period even though the original picture is distinct.

Y ADD OFF

When the tape speed is approximately +/−1.5 times and above or +/−0.5 times and below, the picture on the monitor screen moves vertically by one line in the short period and it may seem flicker.
When the tape speed is near to +/−1 times, the picture moves vertically by one line in the long period but the picture does not become indistinct.

Modification Procedure

The parts necessary for the modification are prepared as "BVT-KIT 5".

1pc	A-6259-201-A	Complete PCB, DP-28
1pc	A-6259-202-A	Complete PCB, DP-29
1pc	8-759-755-80	IC, MB7052-S3NB, PROM

(Note 1) The PWA No. of the SG-28 board is changed from A-6259-070-A to A-6259-070-B by replacing IC-F5 with MB7052-S3NB.

(Note 2) BVT-KIT5 does not include the jumpers for modification.

DO-12/DP-28 board:
Replace DO-12 board with DP-28 board.

BD-5/DP-29 board:
Replace BD-5 board with DP-29 board.

SG-28 board:
Replace IC-F5 with MB7052-S3NB.

Mother board:
Add the 9 jumpers as follows.
(Note) The mother board in the BVT-2000 with serial number 52701 and up has been modified at the factory.

CN5 (DO-12/DP-28)		CN4 (BD-5/DP-29)
41A	B DATA 2^6	41A
41B	C DATA 2^0	41B
42A	B DATA 2^5	42A
42B	YW INH	42B
43A	B DATA 2^4	43A
43B	CW INH	43B
44A	B DATA 2^3	44A
44B	YC SEP	44B
45A	PB BLK	45A

After modification, check and adjust the BVT-2000 referring to section 2-3 of BVT-2000 Manual.

(3) Vertical Fluctuation in Edit Preset of BVH-2000/2180
Vertical Shift in Δt Rec Preset of BVH-2500.

In the Edit Preset mode, BVH-2000/2180 can play back a picture just before editing without noise by the DT head. But when the tape speed is +2 times or more, the time base error of the playback signal may overflow the window of the TBC and it results in the vertical shift of the picture on the monitor screen.
This modification delays the window center of the TBC in the confidence mode by 2 lines compared with the unmodification.

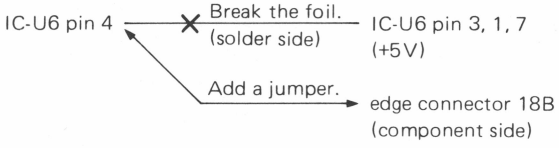
The BVH-2500 has a feature which can perform the Δt REC (STILL REC, STEP REC and SLOW REC) operation in comparison with the BVH-2000. When the BVH-2500 is used in Δt REC PRESET mode, the amount of the advance is insufficient and the V-blanking appears on the upper side of the CRT because the playback phase of the VTR is delayed by 8H against the advanced sync signal. The REF V which is generated from the SG-18 board of BVT-2000 is delayed by 12H (when one MY-3 board is installed) or by 16H (when two MY-3 boards are installed) to give the appropriate window by performing the following modifications.

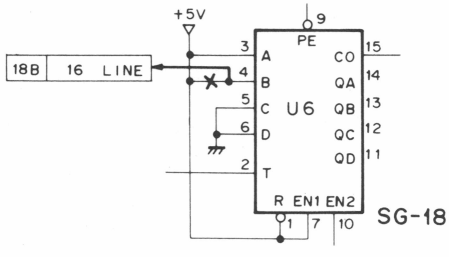
When using BVT-2000 in combination with BVH-2000/2180, perform the Modification Procedure A, B or C. When using BVT-2000 in combination with BVH-2000/2180 and/or BVH-2500, perform the Modification Procedure C, D or E.

Modification Procedure A

Applicable to BVT-2000 #10001 to #63099

SG-18 board* (PWB No. 1-588-049-11, 12, 13 or 14)
*: The SG-18 board does not have a small board SG-69 on it.

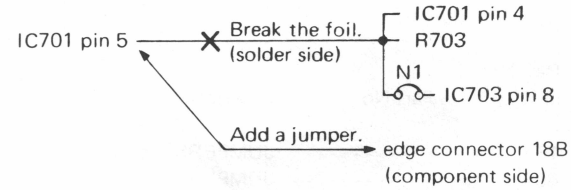


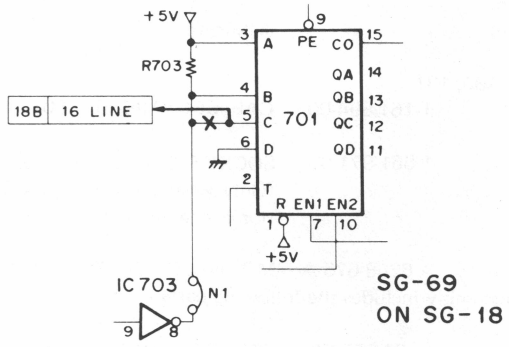


Modification Procedure B

Applicable to BVT-2000 #10001 to #63099

SG-18 board* (PWB No. 1-588-049-14 & above)
*: The SG-18 board has a small board SG-69 on it. Modify the SG-69 board with PWB No. 1-607-436-11 as follows.





Modification Procedure C

Applicable to BVT-2000 #10001 to #64099

Step. 1 Prepare the following parts.

Ref.No. or Q'ty	Part No.	Description
1pc	A-6259-249-A	COMPLETE PCB, SG-11
C74	1-109-548-00	CAP, MICA 360PF 5% 100V
R117	1-214-172-00	RES, METAL 47K 1% 1/4W

Step. 2 Replace the SG-18 board to SG-11 board.

A-6259-072-A or B COMPLETE PCB, SG-18
(Board No. 1-588-049-11 to 15)
(Note) There are two kinds of SG-18 boards, one is the board with SG-69 small board, the other is the SG-18 board by itself.

→ A-6259-249-A COMPLETE PCB, SG-11

Step. 3 Replace C74 and R117 on the SG-28 board as follows.
C74 CAP, MICA 120PF → CAP, MICA 360PF
R117 RES, METAL 36K → RES, METAL 47K

Modification Procedure D

Applicable to BVT-2000 #10201 to #52699

SG-18 board* (PWB No. 1-588-049-12, 13 or 14)

* The SG-18 board does not have a small board SG-69 on it.

Step 1. Prepare the following parts.
These parts are also required for the Modification Procedure E.

Ref. No. or Q'ty	Part No.	Description
15mm	----------	JUMPERS (2pcs)
65mm	----------	JUMPER
90mm	----------	JUMPER
125mm	----------	JUMPER
185mm	----------	JUMPER
C129, 130, 131		
	1-161-894-00	CAP, CERAMIC 0.1 50V
1pc	1-561-971-00	SOCKET, SINGLE INLINE, 20P (Only when performing the Modification Procedure D.)
1pc	A-6268-075-A	MOUNTED PCB, SG-88(N)
(This assembly includes the following parts.)		
C2	1-161-055-00	CAP, CERAMIC 0.022 10% 50V
IC1	8-759-901-61	IC SN74LS161AN, TTL; TI
IC2	8-759-901-74	IC SN74LS174N, TTL; TI
IC3	8-759-900-04	IC SN74LS04N, TTL; TI
IC4	8-759-761-63	IC MB7051-SG-88 KU-3, PROM
IC5	8-759-901-61	IC SN74LS161AN, TTL; TI
IC6	8-759-901-61	IC SN74LS161AN, TTL; TI
R1	1-247-845-00	RES, CARBON 3.9K 1/8W 5%
1pc	1-560-880-11	PLUG, SINGLE INLINE, 20P
1pc	1-611-342-00	PC BOARD, SG-88(N)
1pc	3-531-576-01	RIVET
1pc	3-659-862-01	BRACKET, PC BOARD

Step 2. Remove C518 (located at address U7), IC-T6, IC-U6 and RS510 (located at address T6) from the SG-18 board.

Step 3. Prepare two eight-pin sockets cut off from a 20-pin single-in-line socket and install one at former IC-T6 pin 1 to pin 8, the other at former IC-U6 pin 9 to pin 16.

Step 4. Replace C129, 130 and 131 (all located at address U7).
0.022 50V ⟶ CERAMIC 0.1 50V

Step 5. Cut the trace.
IC-P5 pins 10, 12, 13 —(solder side)—✕— R166

Step 6. Add six jumpers.
Former IC-T6 pin 4 ⟷ (solder side) ⟷ IC-R6 pin 10
Former IC-T6 pin 6 ⟷ (solder side) ⟷ IC-P5 pins 10, 12, 13
Former IC-U6 pin 2 ⟷ (solder side) ⟷ Former IC-U6 pin 15
Former IC-U6 pin 12 ⟷ (solder side) ⟷ C508
Former IC-U6 pin 14 ⟷ IC-W3 pin 10

(Note) Add jumper between IC-W3 pin 10 on the component side and former IC-U6 pin 14 on the solder side through the hole of former IC-U6 pin 3.

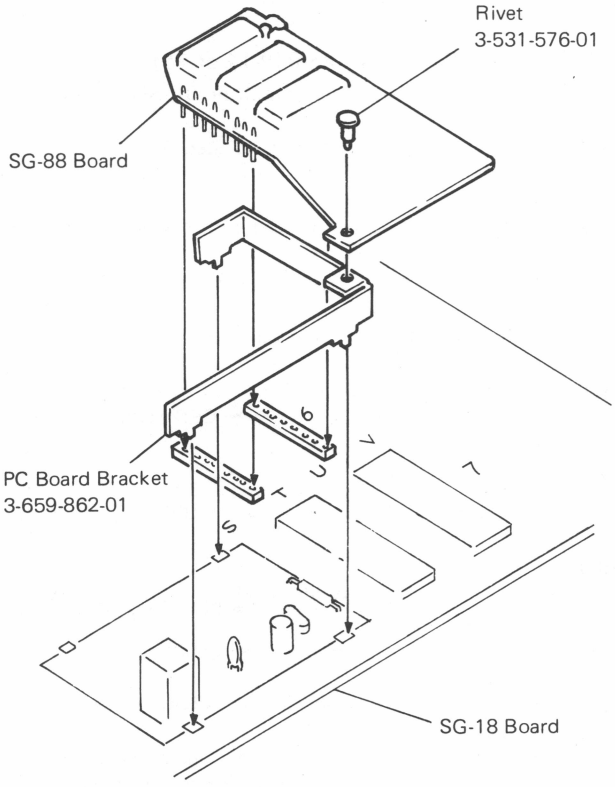
Former IC-U6 pin 13 ⟷ Edge connector 18B

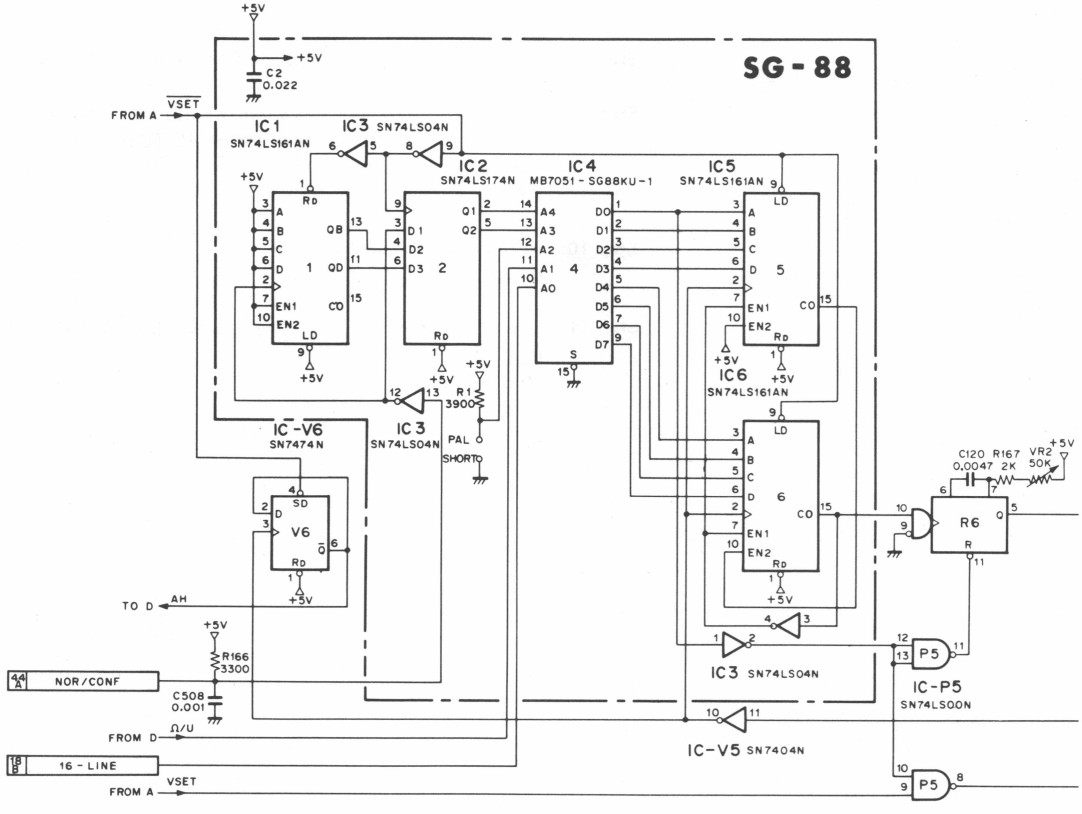
(Note) Add jumper between edge connector 18B on the component side and former IC-U6 pin 13 on the solder side through the hole of former IC-U6 pin 4.

Step 7. Install C2, IC1, 2, 3, 4, 5, 6 and R1 on the SG-88 board.

Step 8. Prepare two eight-pin plugs cut off from a 20-pin single-in-line plug and install one at former IC-T6 pin 1 to pin 8, the other at former IC-U6 pin 9 to pin 16, on the solder side.

Step 9. Solder the pc board bracket to SG-18 board as shown below.

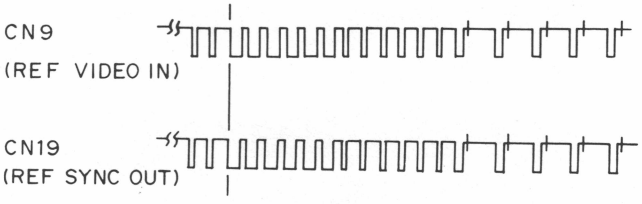




Step 10. Check after modification.

Connect the BVT-2000 and BVH-2500 but one MY-3 board must be installed on the BVT-2000.

Set the VTR to normal playback mode and check that the phase of REF SYNC OUT (output from the edge connector 19) on the SG-18 board coincides with that of the EXT VIDEO IN(input to the edge connector 9).



When the VTR set to Δt REC or REC CONF, check that the signal of edge connector 19 is delayed against that of edge connector 9.

MODE	DELAY
Δt REC	12H
REC CONF	92H

Modification Procedure E

Applicable to BVT-2000 #52701 to #64099

SG-18 board* (PWB No. 1-588-049-14 or 15)

* The SG-18 board has a small board SG-69 on it.

Step 1. Prepare the parts, referring to step 1 in Modification Procedure D.

Step 2. When the Modification Procedure B has been performed, remove the jumper.
IC701 pin 5 ◄—✕—► Edge connector 18B

Step 3. Remove SG-69 board from SG-18 board.

Step 4. Replace C129, 130 and 131 (all located at address U7).
0.022 50V ——► CERAMIC 0.1 50V

Step 5. Cut the trace.
IC-P5 pins 10, 12, 13 ✕ (solder side) —— R166

Step 6. Add two jumpers.
Former IC-T6 pin 6 ◄— (solder side) —► IC-P5 pins 10, 12, 13,
Former IC-U6 pn 12 ◄— (solder side) —► C508

Step 7. For the unit with #52701 to #63099, add another jumper.
Former IC-U6 pin 13 ◄——► Edge connector 18B
(Note) Add jumper between edge connector 18B on the component side and former IC-U6 pin 13 on the solder side through the hole of former IC-U6 pin 4.

Step 8. Install C2, IC1, 2, 3, 4, 5, 6 and R1 on the SG-88 board.

Step 9. Prepare two eight-pin plugs cut off from a 20-pin single-in-line plug and install one at former IC-T6 pin 1 to pin 8, the other at former IC-U6 pin 9 to pin 16, on the solder side.

Step 10. Install the pc board bracket and SG-88 board to SG-18 board, referring to step 9 in Modification Procedure D.

Step 11. Check the operation, referring to step 10 in Modification Procedure D.

(4) PB V Signal Detection

Applicable to BVT-2000 #10001 to #63099

BVT-2000 has the following two circuits to detect a PB V signal.

Circuit 1: V sync pulse separator

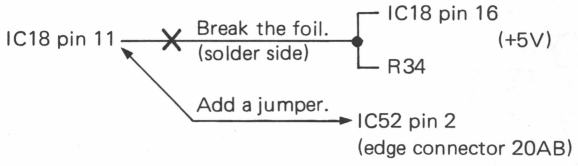
Circuit 2: first equaliging pulse separator

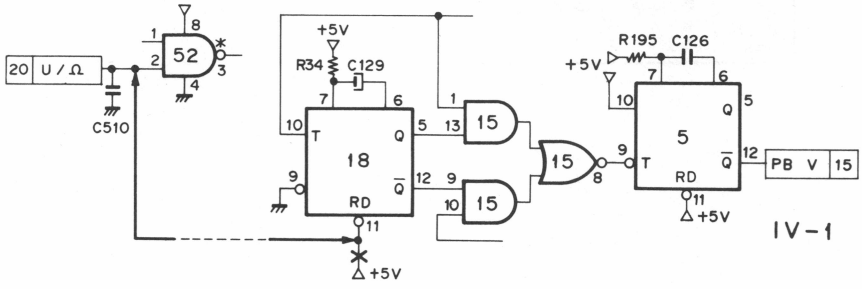
When a V sync pulse exists in the playback video signal of the VTR, the circuit 1 has a priority. But, when the phase difference between the SYNC head output and the VIDEO head output is too large, the circuit 1 cannot detect a PB V signal with correct phase.

By this modification, the circuit 2 operates for BVH VTRs whether a V sync pulse exists or not in the playback signal.

Modification Procedure

IV-1 board: Modify the IV-1 board as follows.





(5) Video Level Control in Bidirex Mode

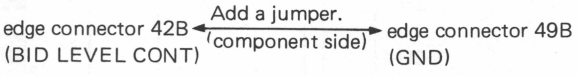
Applicable to BVT-2000 #10001 to #63999

BVT-2000 compensates the video level change caused by the tape speed variation. Overcompensation, however, is caused by using BVT-2000 with BVH-2000 or BVH-2500 because BVH-2000 or BVH-2500 has the same function in itself, therefore the compensator in the TBC should be killed.

(Note) Don't perform this modification when using BVT-2000 together with the BVH VTRs except BVH-2000 or BVH-2500 series VTRs.
If serial number of the BVT-2000 is greater than 64001 (IV-1 Board No. 1-588-040-17 & up), set SW5 on the IV-1 board to ON instead of the modification.

Modification Procedure

IV-1 board(Board No. 1-588-040-11 to 16): Add a jumper as follows.



2-11. ALTERING AUDIO IN/OUT SPECIFICATIONS

2-11-1. Altering the Audio Output Impedance

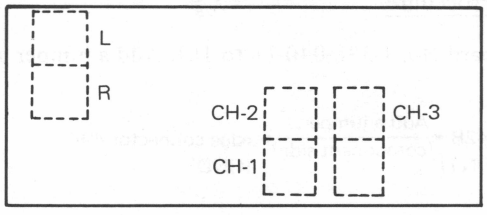
The line output impedance of audio CH-1, 2 and 3 and the monitor L & R is set to 600Ω when shipped. However, the LA-02 board remodeled as shown below makes 150Ω or 37.5Ω impedance possible.

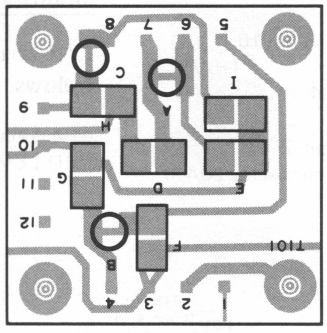
Output impedance	Pattern (each CH)								
	A	B	C	D	E	F	G	H	I
600Ω	□-□	□-□	□-□	□□	□□	□□	□□	□□	□□
150Ω	□-□	□-□	□-□	□-□	□-□	□□	□□	□□	□□
37.5Ω	□ □	□ □	□ □	□-□	□-□	□-□	□-□	□-□	□-□

□-□ : Leave shorted.
□ □ ; Open (Cut pattern).

□□ ; Leave open.
□-□ ; Short (Solder).

LA-02 BOARD: SOLDER SIDE



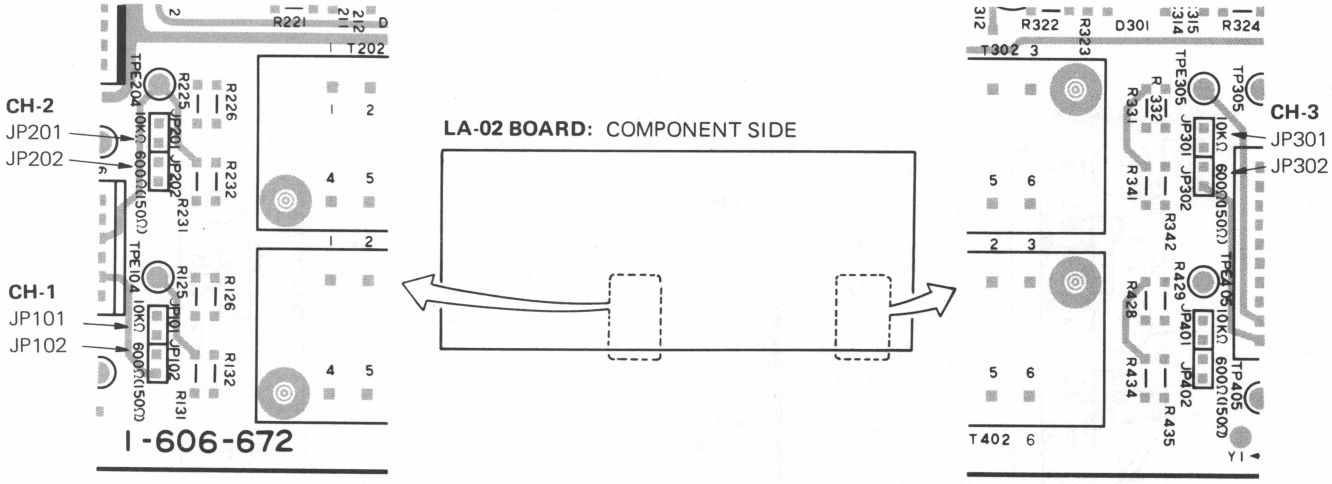


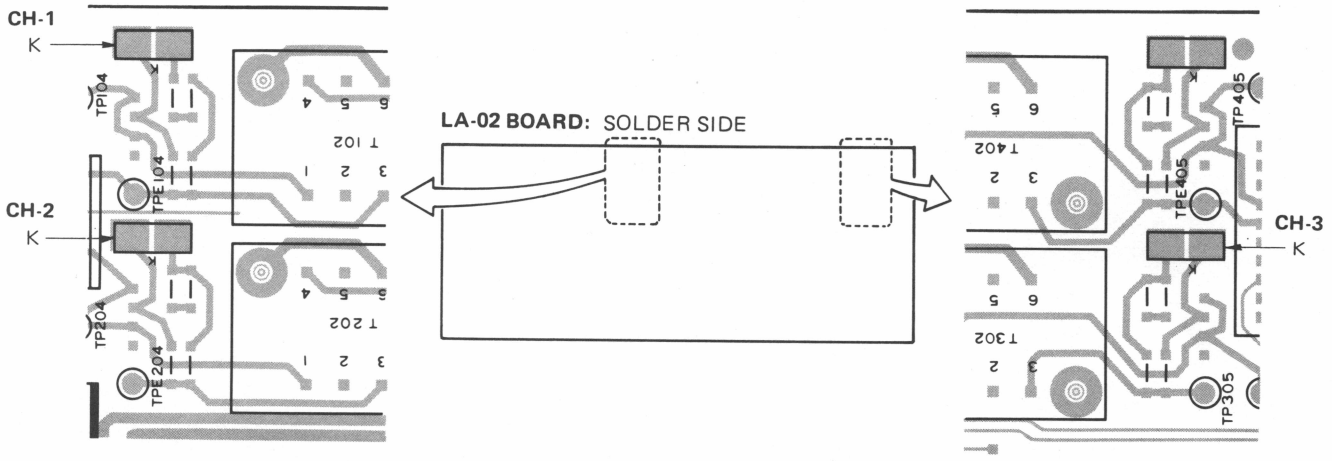
2-11-2. Altering the Audio Input Impedance

The line input impedance of audio CH-1, 2 and 3 is set to 600Ω when shipped. However, the LA-02 board remodeled as shown below makes 10kΩ or 150Ω impedance possible.

Input impedance	Jumper plug			Pattern
	CH-1	CH-2	CH-3	Each CH
	JP101/102	JP201/202	JP301/302	K
10kΩ	JP101	JP201	JP301	X
600Ω	JP102	JP202	JP302	□□
150Ω	JP102	JP202	JP302	⊡⊡

X ; Don't care.
□□ ; Leave open.
⊡⊡ ; Short (Solder).

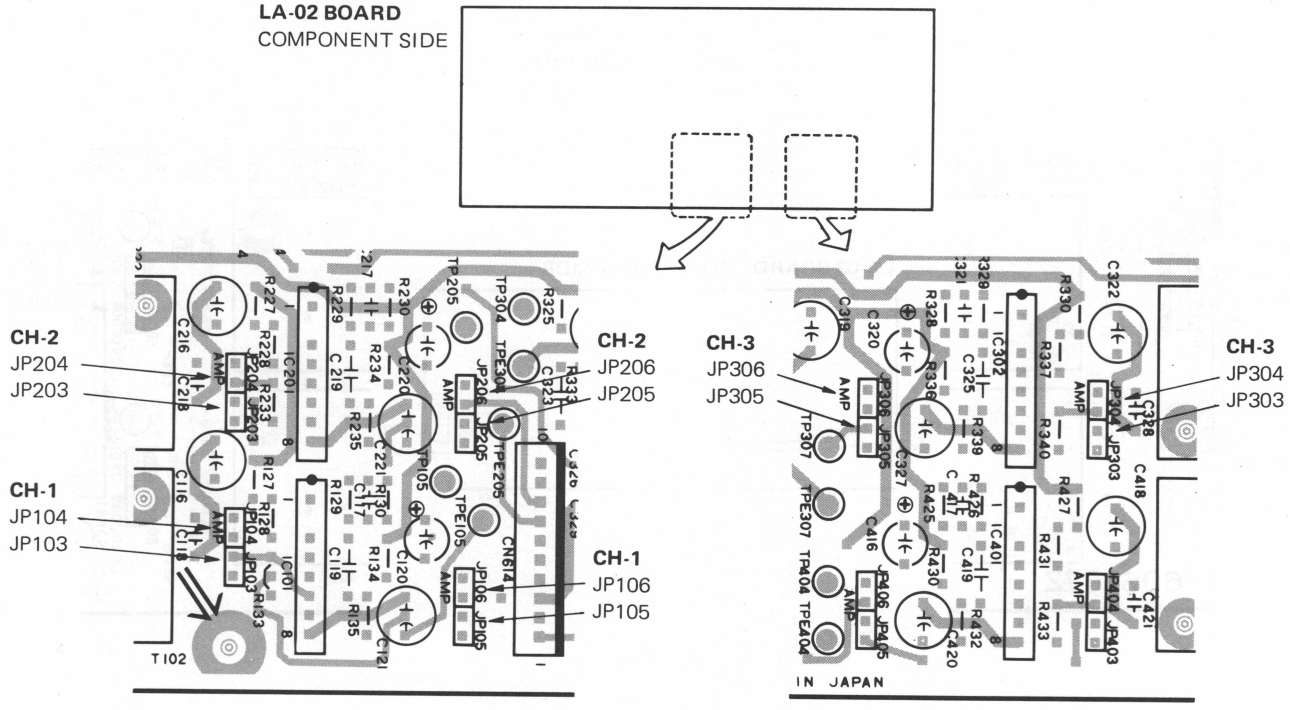




2-11-3. Altering the Audio Input Level

Altering the jumper plug settings on the LA-02 board makes it possible to change the audio CH-1, 2 and 3 line input reference level from +8 dB to −12 dB.

Reference input level	Jumper plug					
	CH-1		CH-2		CH-3	
	JP103 104	JP105 106	JP203 204	JP205 206	JP303 304	JP305 306
+8dB	JP103	JP105	JP203	JP205	JP303	JP305
−12dB	JP104	JP106	JP204	JP206	JP304	JP306



SECTION 3
PERIODIC CHECK AND MAINTENANCE

3-1. PERIODIC CHECK ITEM AND PERIOD

A. Following table shows standard period of cleaning, confirmation, adjustment and replacement of the principal parts.

B. If you cannot find the part, see the page of section-D in the manual of Vol. 3.

C. The part marked with ↑ is not required to replace as a single part because it is included in the assembly above of the arrow mark ↑.

Note 1: The "time" described here is the integrated time of the head hours meter. When the machine is used as table-top type, sum up time indicated by the head hours meter every replacement of the upper drum or the head drum assembly.

Note 2: Only the latest part number is described here. When ordering a part, see the page of section D in volume 3, referring to the section of the replacement procedure that is applicable to the part.

BLOCK NAME OR PART NAME		PART NUMBER	PAGE OF SECTION D	DAILY	2500 HOURS	5000 HOURS	7500 HOURS	10000 HOURS	12500 HOURS	15000 HOURS	REMARKS
TAPE PATH BLOCK				CLN	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ	Refer to section 3-2 for cleaning and section 3-24-2 for adjustment.
BEARINGS OF GUIDE ROLLER 1, 2		3-656-948-00	D-21, D-22		RPL	RPL	RPL	RPL	RPL	RPL	After replacement, refer to section 3-24-2 for the tape running adjustment.
MOVABLE GUIDE ASSY		A-6046-034-B	D-27, D-28	CLN				RPL			Refer to section 3-6 for replacement and to section 3-24-1 for adjustment.
ENTRANCE SLANT GUIDE ASSY		A-6046-037-C	D-27, D-28	CLN		RPL		↑		RPL	Replace in accordance with section 3-8.
EXIT SLANT GUIDE ASSY		A-6046-035-A	D-27, D-28	CLN		RPL		↑		RPL	Replace in accordance with section 3-8.
REED SWITCH ON THE TH-03 BOARD		1-552-180-00	D-27, D-28		RPL	RPL	RPL	↑	RPL	RPL	Refer to section 3-23-2 for replacement.
TAPERED GUIDE		3-673-725-00	D-27, D-28	CLN	RPL	RPL	RPL	↑	RPL	RPL	After replacement, verify RF waveform in accordance with section 3-4.
IP ROLLER SHAFT ASSY		A-6046-027-E	D-31, D-32	CLN		RPL		RPL		RPL	
BEARINGS OF IP ROLLER SHAFT ASSY		3-659-213-00	D-31, D-32		RPL	↑	RPL	↑	RPL	↑	
IP DRIVING ASSY		A-6037-022-A	D-35, D-36				RPL			RPL	
DRUM BLOCK				CLN							Refer to section 3-2.
DEMAGNETIZING OF HEADS											When required, demagnetize the heads referring to section 3-3.
TRACKING CHECK											Every 250 hours, verify that the RF waveform satisfies the specified value referring to section 3-4. If not, perform the adjustment in accordance with section 3-24-5.
HEAD DRUM ASSY	For NTSC	A-6050-220-A	D-23, D-24	CLN		RPL		RPL		RPL	Replace in accordance with section 3-6. After replacement, perform the adjustment in accordance with the flowchart shown in section 3-24-1.
	For PAL	A-6050-298-A									
UPPER DRUM ASSY	For NTSC	A-6052-057-A	D-23, D-24	CLN	Check the head projection every 500 hours. If necessary, replace the upper drum.						Check the head projection referring to section 3-5 and when the upper drum has been replaced, the adjustments should be performed in accordance with the flowchart shown in section 3-24-1.
	For PAL	A-6052-060-A									
SLIP RING and BRUSH		A-6709-428-A A-6709-429-B	D-23, D-24		RPL	↑	RPL	↑	RPL	↑	Clean them when required. And perform cleaning and replacement in accordance with section 3-7.
REEL TABLE BLOCK											
REEL STOPPER PIN		3-673-680-00	D-17, D-18			RPL		RPL		RPL	After replacement, verify the height of the reel table in accordance with section 3-24-2.
REEL CLAW ASSY		X-3651-315-0	D-17, D-18			RPL		RPL		RPL	If reel table has been removed when the reel claw assy is replaced, verify the height of the reel table in accordance with section 3-24-2.
BRAKE BAND		X-3673-601-0	D-17, D-18		RPL	RPL	RPL	RPL	RPL	RPL	Replace in accordance with section 3-10.
BRAKE SOLENOID		1-454-304-00	D-17, D-18				RPL			RPL	Replace in accordance with section 3-11.
S REEL MOTOR		8-838-028-01	D-17, D-18				RPL			RPL	Replace in accordance with section 3-9-1.
T REEL MOTOR		8-838-028-11	D-17, D-18				RPL			RPL	Replace in accordance with section 3-9-2.
MECHANICAL BRAKE					ADJ	ADJ	ADJ	ADJ	ADJ	ADJ	Refer to section 3-9 for the brake torque adjustment.

CLN: cleaning, CFM: confirmation, ADJ: adjustment, RPL: replacement

BLOCK NAME OR PART NAME	PART NUMBER	PAGE OF SECTION D	DAILY	2500 HOURS	5000 HOURS	7500 HOURS	10000 HOURS	12500 HOURS	15000 HOURS	REMARKS
TENSION ARM BLOCK										
S-TENSION ARM ASSY	A-6042-018-B	D-21, D-22	CLN			RPL			RPL	Replace in accordance with section 3-12.
T-TENSION ARM ASSY	A-6042-019-A	D-21, D-22	CLN			RPL			RPL	Replace in accordance with section 3-13.
BEARINGS OF T-TENSION ARM	3-659-213-00	D-21, D-22		RPL	RPL	↑	RPL	RPL	↑	
AIR DAMPER	3-673-614-00	D-21, D-22		ADJ	ADJ	↑	ADJ	ADJ	↑	
CAPSTAN BLOCK										
PINCH ROLLER	3-656-909-02	D-29, D-30	CLN	RPL	RPL	RPL	RPL	RPL	RPL	Replace in accordance with section 3-18.
BEARINGS OF PINCH ROLLER	3-656-913-00	D-29, D-30		RPL	RPL	RPL	RPL	RPL	RPL	Replace referring to section 3-18.
SOLENOID OF PINCH ROLLER	1-454-305-00	D-29, D-30			ADJ	RPL		ADJ	RPL	Replace in accordance with section 3-19.
JOINT PIN OF PLUNGER	3-673-748-00	D-29, D-30			RPL		RPL		RPL	Replace referring to section 3-19.
CAPSTAN MOTOR	8-838-029-01	D-29, D-30	CLN		RPL		RPL		RPL	Replace in accordacne with section 3-17.
MINI TENSION ARM ASSY	X-3673-669-0	D-29, D-30	CLN							When required replace in accordance with section 3-15.
SOLENOID OF MINI TENSION ARM	1-454-263-21	D-29, D-30				RPL			RPL	Replace in accordance with section 3-16.
STATIONARY HEAD BLOCK			CLN							
DEMAGNTIZING OF HEADS										When required, demagnetize the head referring to section 3-3.
AUDIO R/P HEAD	8-825-737-10	D-31, D-32	CLN	RPL	RPL	RPL	RPL	RPL	RPL	Replace in accordance with section 3-20. After replacement, perform the adjustment in accordance with the flowchart in section 3-24-1.
AUDIO MONITOR HEAD	8-825-737-20	D-31, D-32	CLN	RPL	RPL	RPL	RPL	RPL	RPL	Replace in accordance with section 3-21. After replacement, perform the adjustment in accordance with the flowchart in section 3-24-1.
AUDIO ERASE HEAD	8-825-725-50	D-31, D-32	CLN							When required, replace in accordance with section 3-22.
HD-07 BOARD	1-606-680-00	D-31, D-32		RPL	RPL	RPL	RPL	RPL	RPL	
TIMER ROLLER BLOCK										
ROLLER ASSY For NTSC	A-6045-018-C	D-21, D-22	CLN	RPL	RPL	RPL	RPL	RPL	RPL	Replace in accordance with section 3-23-1.
ROLLER ASSY For PAL	A-6045-019-C									
BEARINGS OF TIMER ROLLER	3-651-607-00	D-21, D-22		RPL	RPL	RPL	RPL	RPL	RPL	Refer to section 3-23-1 for replacement.
FAN MOTOR (POWER BLOCK)	1-541-203-00	D-5, D-6				RPL			RPL	
FAN MOTOR (POWER BLOCK)	1-541-170-21	D-5, D-6				RPL			RPL	
FAN MOTOR (UPPER SIDE)	1-541-170-21	D-35, D-36			RPL		RPL		RPL	
POWER SWITCH	1-554-066-00	D-15, D-16				RPL			RPL	

CLN: cleaning, CFM: confirmation, ADJ: adjustment, RPL: replacement

3-2. CLEANING

1. Clean the surface of the parts shown with ☛ in Fig. 3-1 with cleaning piece or cotton swab moistened with cleaning fluid (for example, FREON 113).

NOTE 1: Open the movable guide, and clean the guide posts and guide flanges sufficiently. If tape chips or back coating material of tape stick to the guide pins of the entrance or exit slant guides, the tape may be cut during operation.

NOTE 2: BVH-2000/PS 00 model has the guide post 2 instead of the audio/CTL monitor head but it has not the mini tension arm.

NOTE 3: With the power off, clean the rotary heads.

NOTE 4: Clean the rotary heads in the direction of their rotation and never clean them vertically. Do not use a cotton swab for head cleaning.

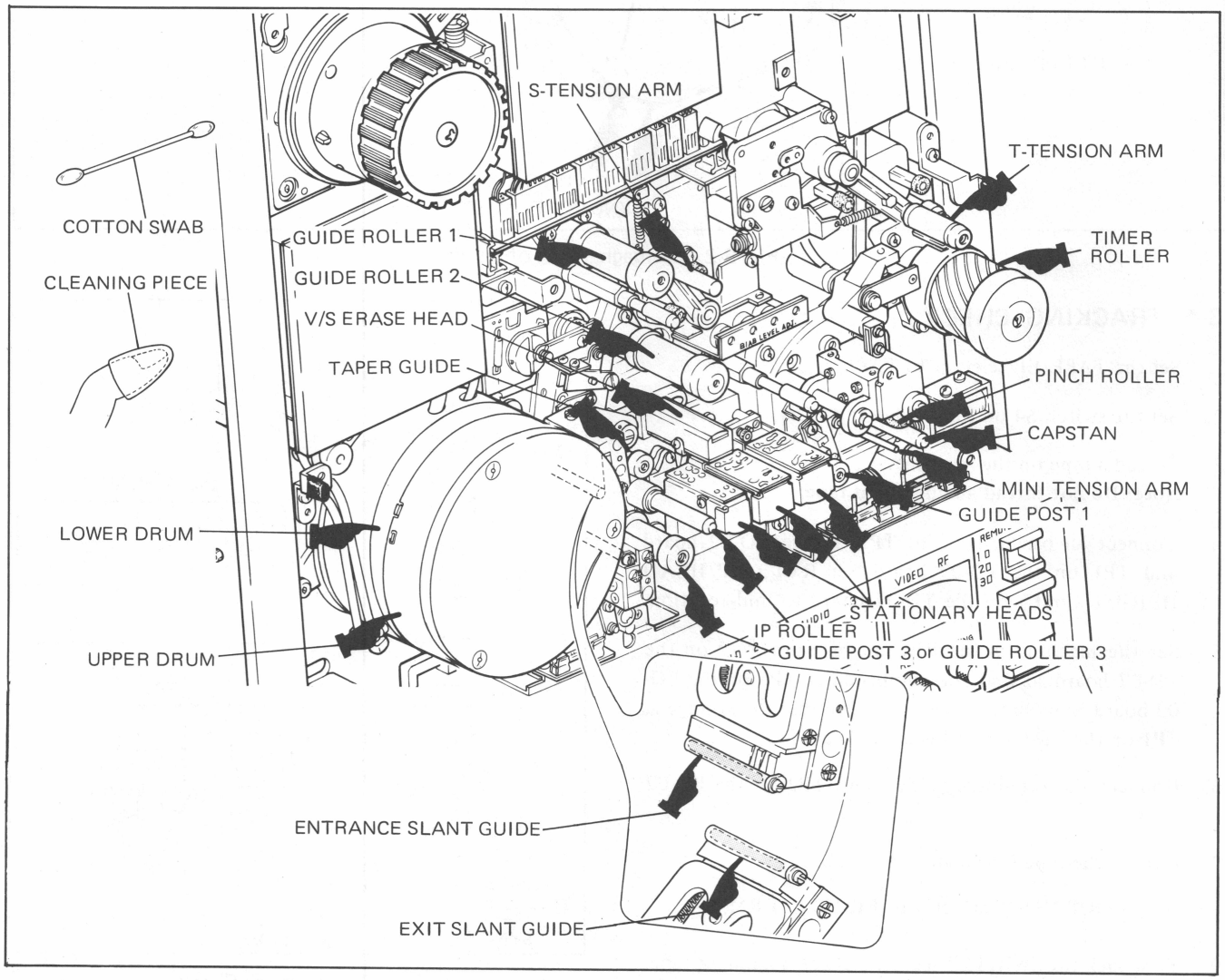


Fig. 3-1. Cleaning of the Surfaces of Guides and Heads on the Tape Path

3-3. DEMAGNETIZING OF HEADS

If the moiré of video signal or the audio signal distortion exceeds the allowable limit, demagnetize the rotary heads or stationary heads shown in Fig. 3-2 with the demagnetizer (SONY HE-4).

Bring the tip of the demagnetizer as close as possible to the head without contacting it. Withdraw the demagnetizer slowly and turn off the demagnetizer when it is at least one meter away from the head.

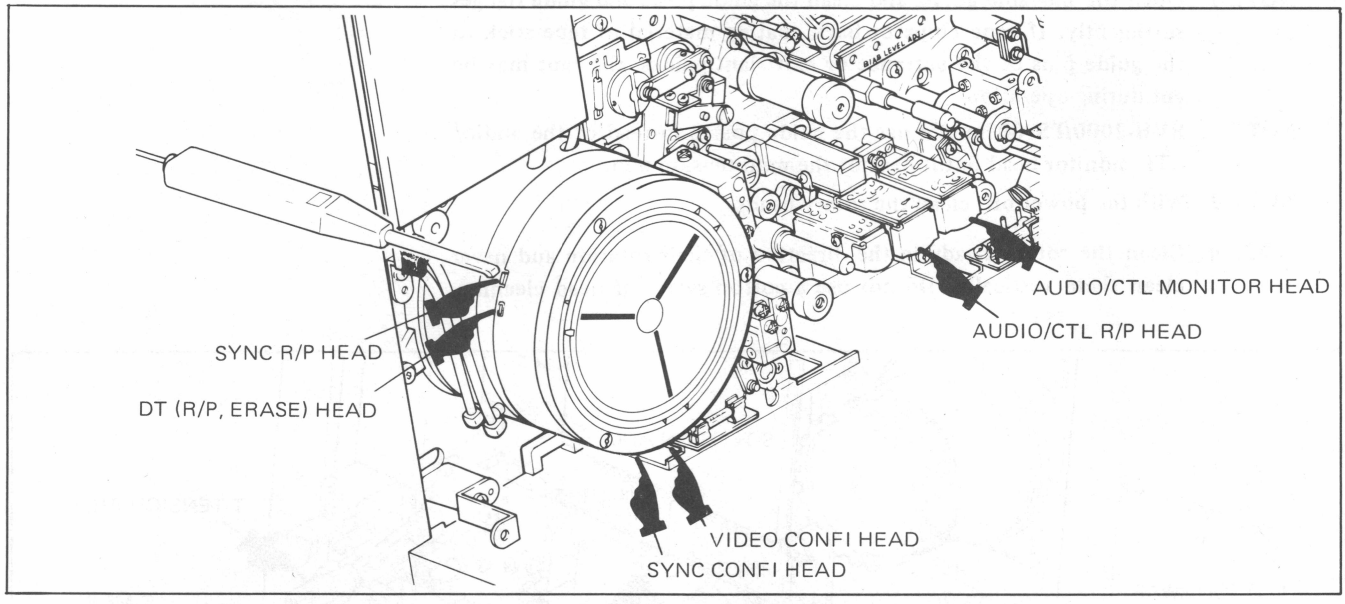


Fig. 3-2. Demagnetizing of Heads

3-4. TRACKING CHECK

1. Set the TAPE/EE selector to TAPE.
2. Set the switch S4 on the DT board to ON.
3. Thread a tape on the machine.
   Note: Do not thread an alignment tape.
4. Connect an oscilloscope to TP5 on the EQ-02 board and TP1 on the TD-07 board, set RV1 (R/P HEAD HEIGHT Cont.) on the TD-07 board to mid-rotation.
5. Set the machine in the REC mode. Turn RV2 on the TD-07 board so that the amplitude at TP5 on the EQ-02 board is maximum. Then confirm that the voltage at TP1 on the TD-07 board is 0 ± 100 mV.
6. Connect the oscilloscope TP1 and TP2 on the EQ-02 board.
7. Change the tape for an alignment tape.
8. Set the R/P MODE selector to FIELD or FRM.
9. Play back the "WHITE" segment of the alignment tape, and check that the RF envelope is within the specified values shown in Fig. 3-3. If not, perform the tracking adjustment.
10. Pull and turn the TRACKING control in both directions and check that the RF waveform maintains almost flat envelope while the amplitude increases and decreases. If necessary, perform the tracking adjustment.

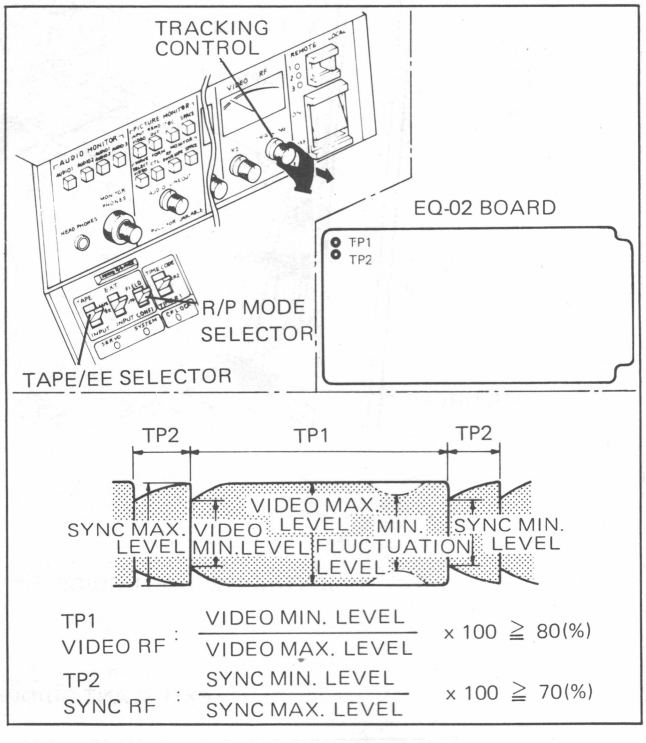


Fig. 3-3. Tracking Check

11. Turn the TRACKING control for the maximum RF amplitude. Push the knob and check that the RF waveform does not change. If it changes, perform the CTL head position adjustment.
12. Reset the switch S4 on the DT board to OFF.

3-5. HEAD PROJECTION CHECK AND UPPER DRUM REPLACEMENT

A. The normal operating time of the rotary heads mounted on the upper drum is guaranteed for 500 hours.

B. If the head projection is less than 50 μm, we recommend to replace the upper drum.

C. The drum eccentricity gauge is used for measuring the head projection.
Sony Part No. J-6040-750-A or
J-6040-750-B

D. Before measuring the head projection or before adjusting the eccentricity of the upper drum, clean the cylindrical surface and the tip of the white pin inserted in measurement arm of the gauge for keeping the heads from damage.

CHECK

1. Remove the drum panel.
2. Confirm that the tip of the dial gauge probe is at the center of the white plastic pin inserted in the measurement arm. If it is not at the center, adjust the dial gauge probe by moving it as shown in Fig. 3-4.
3. Turn the zero adjustment knob full couterclockwise.
4. Press the stopper of the gauge against the lower drum and tighten the fixing knob.
5. To measure the projections of both the DT and video CONFI head, move the gauge in A direction shown in Fig. 3-5 and move it in B or C direction so that half of the dot is hidden. Then turn the gauge slowly back toward the drum.
6. Turn the upper drum by hand so as to bring the head close to the white pin of the gauge. Never touch the head to the pin.
7. Adjust the zero adjustment knob so that the gauge indicates zero.
8. Confirm that the projection of both heads are more than 50 μm. If the projection of either head is less than 50 μm, we recommend to replace the upper drum.
9. To measure the projections of sync heads, move the gauge in A direction shown in Fig. 3-5 and move it in B direction until it stops. Then turn the gauge slowly back toward the drum. Measure the head projections as steps 6 to 8.
   If the projection of either head is less than 50 μm, we recommend to replace the upper drum.

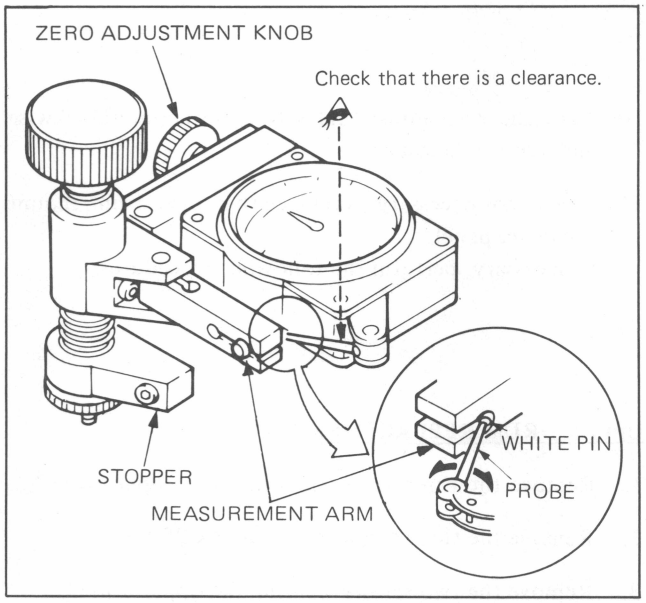


Fig. 3-4. Upper Drum Eccentricity Adj. Gauge

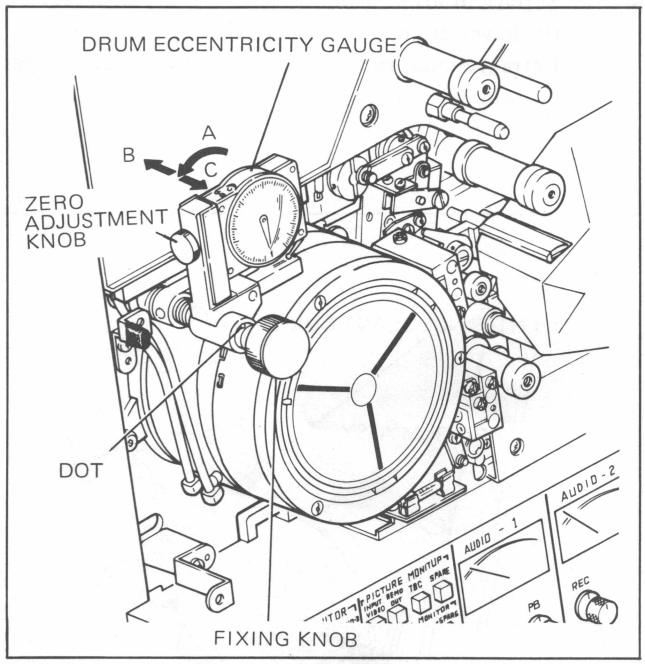


Fig. 3-5. Head Projection Measurement

10. Turn the zero adjustment screw full counterclockwise and remove the gauge.

11. If it is not necessary to replace the upper drum, mount the drum panel.
    If necessary, perform the following procedures.

UPPER DRUM REPLACEMENT

1. Remove the three screws securing the upper drum lid.
2. Remove the three screws securing DR-22 board.
3. Remove the two screws securing the upper drum.
4. Clean the following parts with cloth moistened with cleaning fluid. Refer to Fig. 3-6.
   a. Lower drum flange
   b. Surface of lower drum come in contact with tape on the lower drum
   c. Entrance and exit slant guides and guide flanges
   d. Bottom of the upper drum
5. Match the head mark of DR-23 board on the upper drum to the mark of DR-15 board on the lower drum flange. Mount the upper drum by tightening two taper shaft screws alternately.
   NOTE: taper shaft screw
   SONY Part No. J-6040-460-A
6. Remove the taper shaft screw near the DT head and fix the upper drum with a C4x14 screw, a flat washer and a spring washer and also replace the other taper shaft screw with a C4x14 screw, a flat washer and a spring washer.
7. Loosen two screws tightened in step 6 1/2 or 1 turn.
8. Check that the tip of the dial gauge probe is at the center of the white plastic pin inserted in the measurement arm as shown in Fig. 3-4.
9. Turn the zero adjustment knob full counterclockwise.
10. Press the stopper of the gauge against the lower drum and tighten the fixing knob on the position shown in Fig. 3-7.

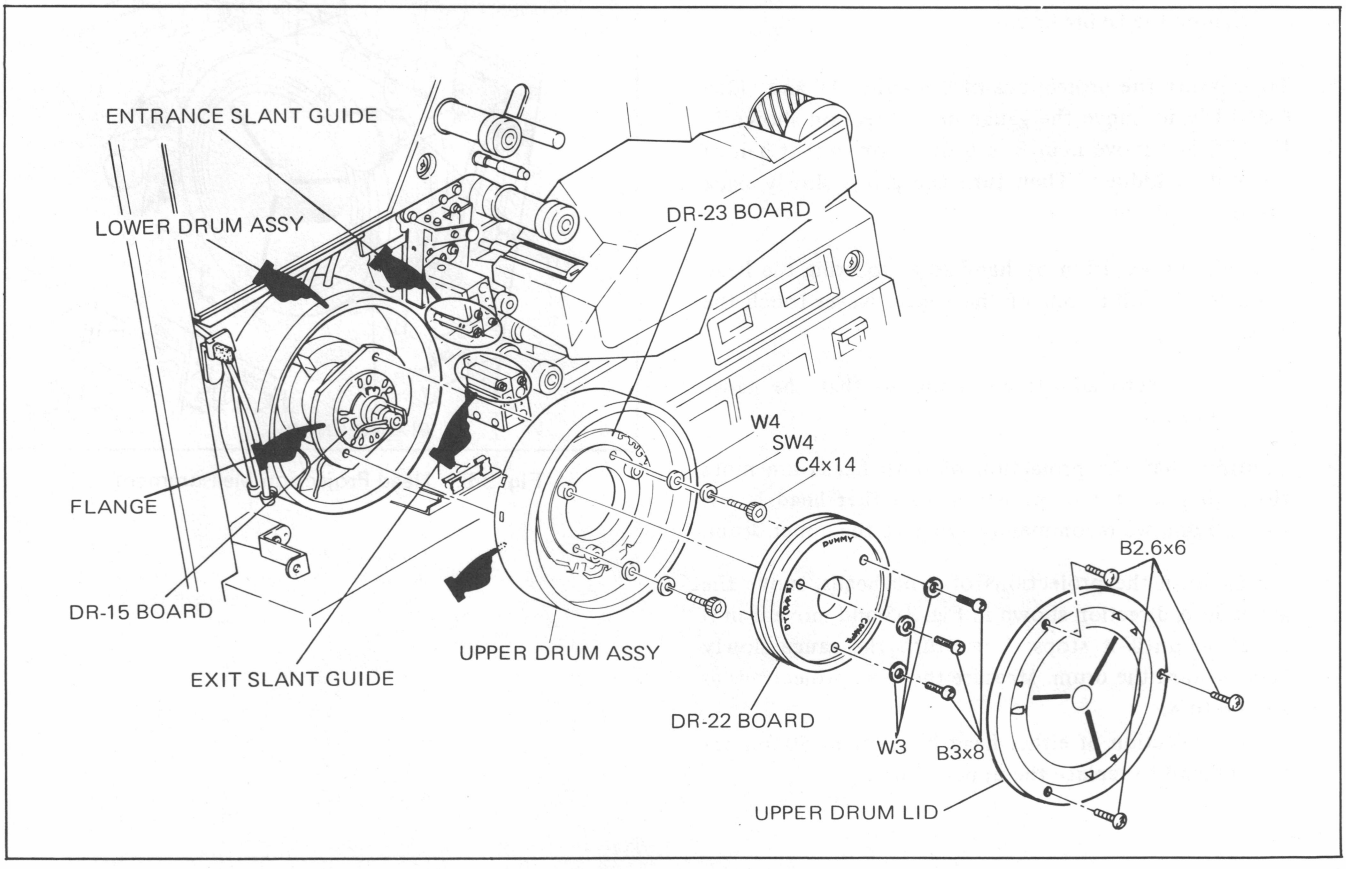


Fig. 3-6. Replacement of Upper Drum Assembly

11. Turn the gauge in A direction as shown in Fig. 3-7 and move it in B direction until it stops. Then turn the gauge slowly back toward the drum.

12. Adjust the zero adjustment knob so that the gauge indicates zero.

13. Slowly rotate the upper drum clockwise and confirm that the swing of the needle is within 3 μm. If the swing of the needle is over 3 μm, adjust as follows.
    a. Rotate the upper drum slowly by hand and stop at the position where the gauge shows the maximum value.
    b. With a screwdriver handle or nylon hammer, lightly tap the inside of the upper drum opposite to the gauge until the gauge reading is about 1/3 of the maximum value.
    CAUTION: Do not tap the outside of the upper drum.
    c. Rotate the upper drum slowly by hand. Confirm that the swing of the needle is within 3 μm. If the swing of the needle is over 3 μm, repeat steps a, b and c, until the swing of the needle is within 3 μm.

14. Tighten the two screws securing the upper drum alternately. Turning the upper drum by hand, confirm that the swing of the needle is always within 3 μm.

15. Turn the zero adjustment knob full counterclockwise, and remove the gauge.

16. Clean the contacts of each boards of DR-15, DR-22 and DR-23 with clean and dry cloth.

17. Place DR-22 board so that the head name of DR-22 board correspond to that of DR-23 board. And after confirming that the brassy ring of the DR-22 board is put on the lower drum flange steadily, fix DR-22 board with the three screws securely.

18. Place the upper drum lid so that the head marks of the drum lid are direcly over that of DR-22 board.

19. Replace the head hours meter with new one which is supplied with the upper drum assembly.

20. Install the drum panel.

21. Perform the adjustments of the flowchart in Section 3-24-1.

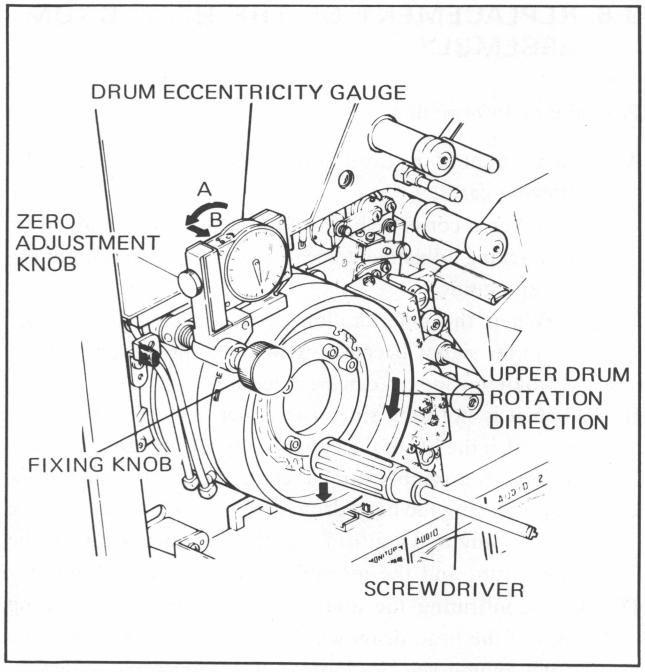


Fig. 3-7. Upper Drum Eccentricity Adjustment

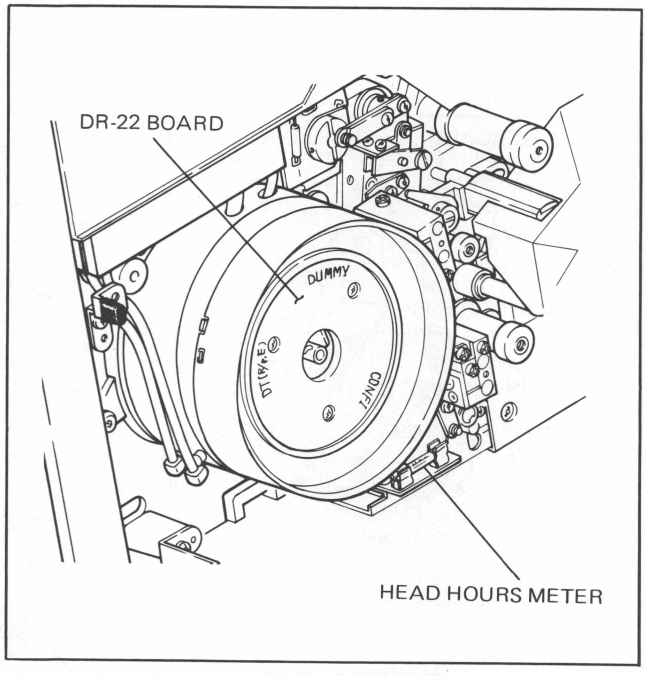


Fig. 3-8. Installation of DR-22 Board

3-6. REPLACEMENT OF THE HEAD DRUM ASSEMBLY

Preliminary Information

A. Replacement of the head drum assembly is required in the following cases.
   ① When a correct RF waveform can not be obtained by tracking adjustment because of wear or damage of the tape guide.
   ② When the deterioration of the video signal or the audio signal because of wear of the bearing of the rotor no longer can be tolerated.

B. When it is not long since the upper drum assembly was replaced, if the life of the video heads still remains, only the lower drum assembly can be replaced (refer to section 6-4).

C. After replacing the head drum assembly, keep the movable guide closing and confirm that the clearance between the upper drum and the movable guide is 50 μm or more.

D. After confirming the above item C, adjust the rotating speed of the head drum when the drum is controlled only by the analog velocity loop of the drum servo system.

E. After performing the above items C and D, adjust each item according to the flowchart in section 3-24-1.

F. The power must be OFF during the replacement.

Removal

1. Remove the stationary head cover, the drum panel, and the reel panel.
2. Move to the rear of the machine, pull the connectors CN117, CN114, and CN112 from the DA-07 board, and pull out the connectors CN291 (except for 00 model) and CN292 from the drum motor.
3. Go to the front, remove the shield cover of the RP-09 board, and pull out the connectors CN263, CN265, CN267, and CN269.
4. For the BVH-2000/2180/PS/PM 02/04 model or BVH-2500/P, pull out the connectors CN271 and CN272 from the head drum assembly.
5. When the entrance and exit slant guides are closed, turn the threading motor with a flat-blade screwdriver to open the slant guides.
6. Slightly loosen the four screws securing the movable guide assembly, and push the assembly in the direction opposite to the head drum assembly, and keep the drum stopper pin apart from the head drum assembly.
7. Remove the three screws securing the drum lid.
8. While holding the head drum assembly securely, remove the three screws and pull out the head drum assembly not to hit against the slant guide.
9. Place the removed head drum assembly with the upper drum down, and remove the three screws securing the drum slant base.

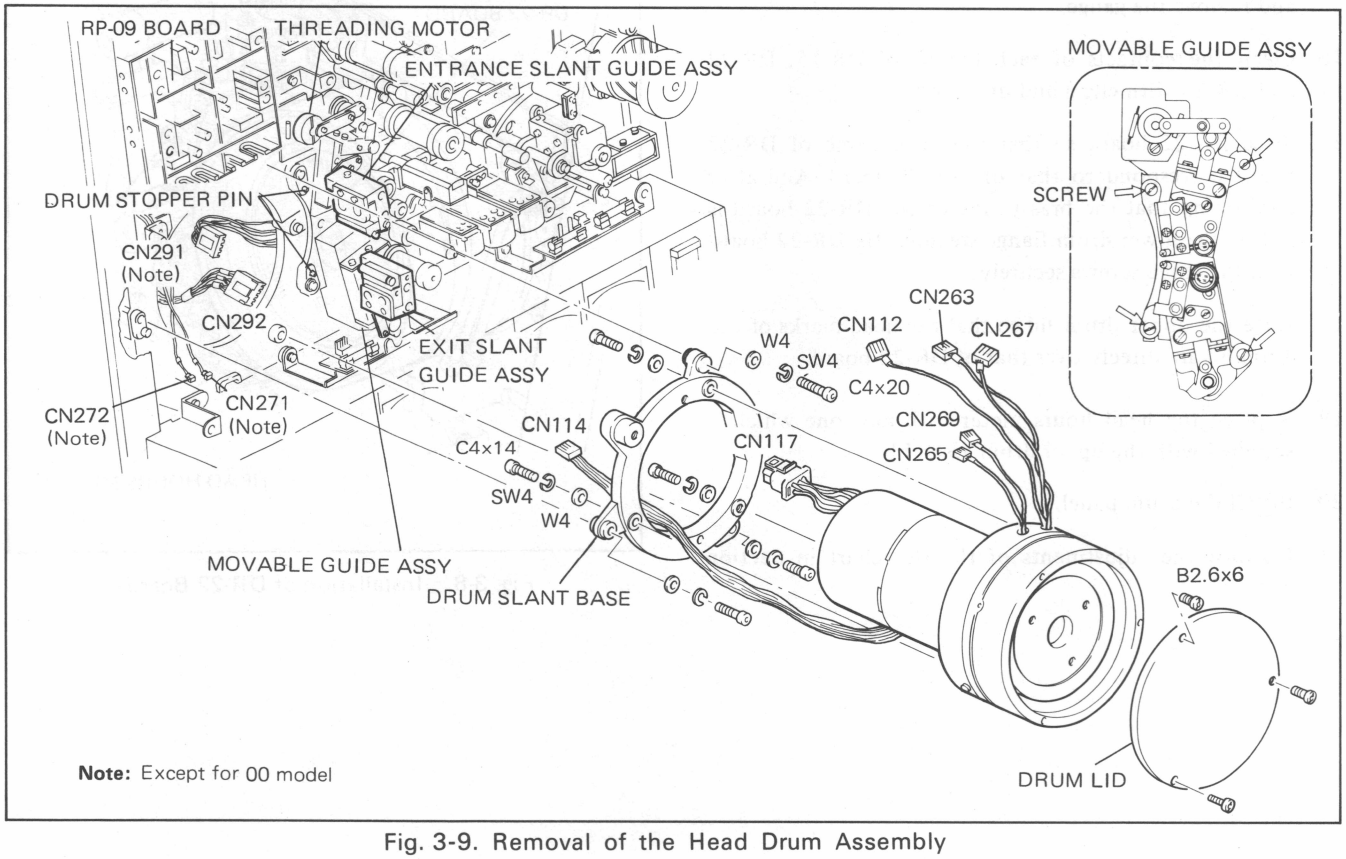


Fig. 3-9. Removal of the Head Drum Assembly

Cleaning

10. Wipe the following parts with a clean cloth moistened with cleaning fluid.
    a. The parts of the entrance and exit slant guides facing the drum.
    b. The upper surface of the boss on which the head drum assembly was installed.
    c. The surface of the new head drum coming in contact with the tape.

    Note: If alcohol was used as cleaning fluid, after performing above cleaning, wipe the above parts with a soft and dry cloth again.

Installation

11. Place the new head drum assembly on a soft cloth so that the upper drum side of the assembly is down.
12. Refer to Fig. 3-9, and fix the drum slant base removed from the old head drum assembly with the three screws (C4×14) via the washers (W4) and the spring washers (SW4) to the new head drum assembly.
13. Pass the connectors CN114 and CN117 through the hole in the base plate to the rear. Hold the head drum assembly securely as shown in Fig. 3-10, match the guide hole of the drum slant base with the pin (A), and then push the part B of the drum slant base against the pin (B). Confirming that the slant base and the bosses on the base plate fit perfectly and fix with the three screws (C4×20) via the washers (W4), and the spring washers (SW4).

    Note: Take sufficient care that the head drum assembly does not hit against the slant guide assembly.
14. Plug the connectors CN263, CN265, CN267 and CN269 at their specified positions on the RP-09 board.
15. For BVH-2000/2180/PS/PM/ 02/04 model or BVH-2500/P, plug the connectors CN271 and CN272 at the positions shown in Fig. 3-10.
16. Pass the connector CN112 through the hole shown in Fig. 3-10 to the rear of the base plate.
17. Go to the rear of the machine, and plug the connectors CN117, CN114 and CN112 at their specified positions on the DA-07 board.
18. Plug the connectors CN291 (except for 00 model) and CN292 at their specified positions at the rear of the drum.
19. Place the drum lid so that the head name written on the drum lid are directly over the same head name on the board cover inside the upper drum. Confirm that the drum lid fits in the upper drum firmly, and fix it with the three screws (B2.6×6).
20. While pushing the movable guide assembly in both directions of the head drum assembly and the eccentric stopper shown in Fig. 3-10 simultaneously, tighten the four screws securely.
21. Replace the head hours meter with new one.

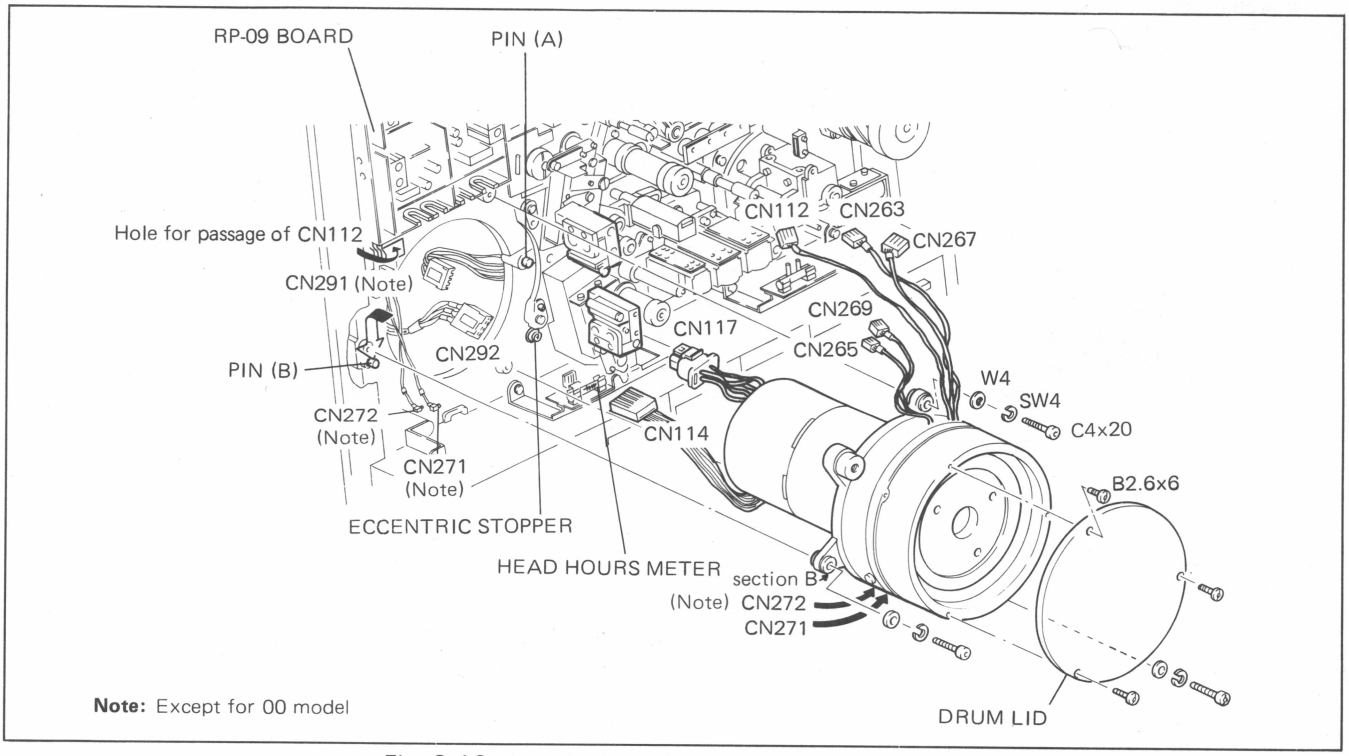


Fig. 3-10. Installation of the Head Drum Assembly

Clearance Confirmation

22. Insert a 50-μm-thick paper (or video tape folded in two) between the upper drum and movable guide including the guide flanges.
23. Turn the threading motor with a flat-blade screwdriver to close the movable guide.
24. Confirm smooth movement of the paper.

Drum Speed Adjustment

25. Turn on the power.
26. Set S4 (TEST 1) switch on the CD-17 board to position "D", and depress S7 (ENTRY) switch for at least 0.5 sec.
    Note: By this procedure, the drum motor will be controled by the analog velocity loop. To release this test condition, carry out one of the following operations.
    a. Turn off the power.
    b. Set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec.
    c. Depress the switch S3 (TEST) on the SY-79 board.
27. Set the machine in STANDBY mode, and confirm that either of the following is displayed or they are displayed alternately on the display element ND1 on the SV-43 board. If different numbers are displayed, adjust RV4 on the CD-17 board.

    FD, FE, FF, 00, 01, 02

28. Turn off the power to release the test mode.
29. Mount the reel panel, the stationary head cover, and the drum panel.
30. Perform the tape path adjustment in accordance with the flowchart shown in section 3-24-1.

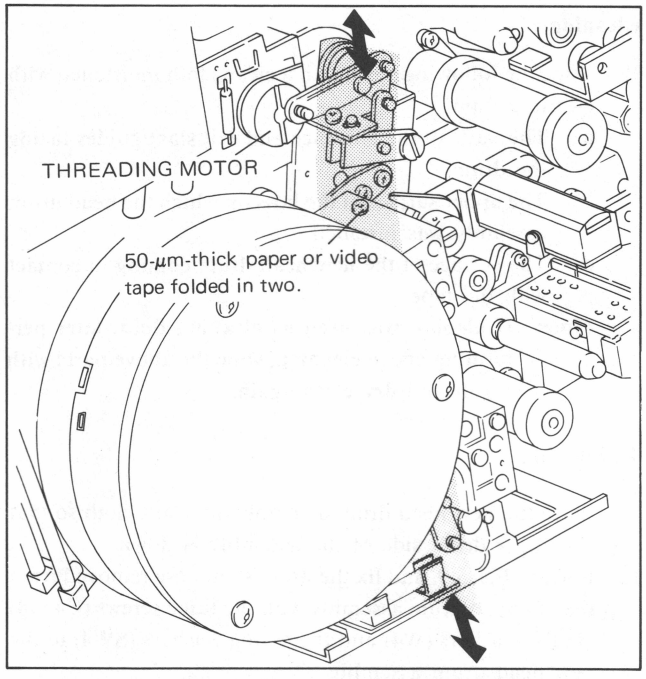


Fig. 3-11. Gap Confirmation

3-7. SLIP RING AND BRUSH CLEANING AND REPLACEMENT (For BVH-2000/PS/PM 02/04 model or BVH-2500/P)

Preliminary Information

A. The slip ring and the brush of the head drum assembly do not require periodic cleaning. However, cleaning should be carried out when slip ring noise of white dots appear on the monitor.

B. For the cleaning, prepare a soft short-haired brush. If no such brush should be available, prepare a cotton swab which the tip are squashed with a hammer etc.

C. Cleaning liquid is not especially required, but FREON 113 etc. should be used when cleaning is difficult.

D. When the slip ring noise does not disappear even after cleaning, it is desirable to replace the slip ring and the brush at the same time.

E. Do not apply conductive grease to the contact parts of slip ring and brush.

F. As the brush bends very easily, it must be handled with sufficient care.

3-7-1. Cleaning of Slip Ring and Brush

Cleaning

1. Go to the rear of the machine and open the power supply block. Pull out the connector CN291 connected to the head drum assembly.
2. Loosen the three screws securing the rear cover to the head drum assembly sufficiently and remove the rear cover.
3. Loosen the screw securing the brush mounting block by 2 turns.
4. Turn the brush mounting block clockwise, until the brush comes completely out of the slip ring grooves and then pull out it.
5. Bring the prepared cleaning brush into contact with the slip ring grooves as shown in the following figure and clean while turning the rotor of the drum.
6. Use the cleaning brush to clean from the brush root on the SL-09 board to the tip.

Note: Do not move the cleaning brush in the opposite direction.

Brush Remounting and Pressure Adjustment

7. Mount the brush mounting block on the head drum assembly in the reverse order of step 4 and tighten the fixing screw so that the brush mounting block can be moved lightly.

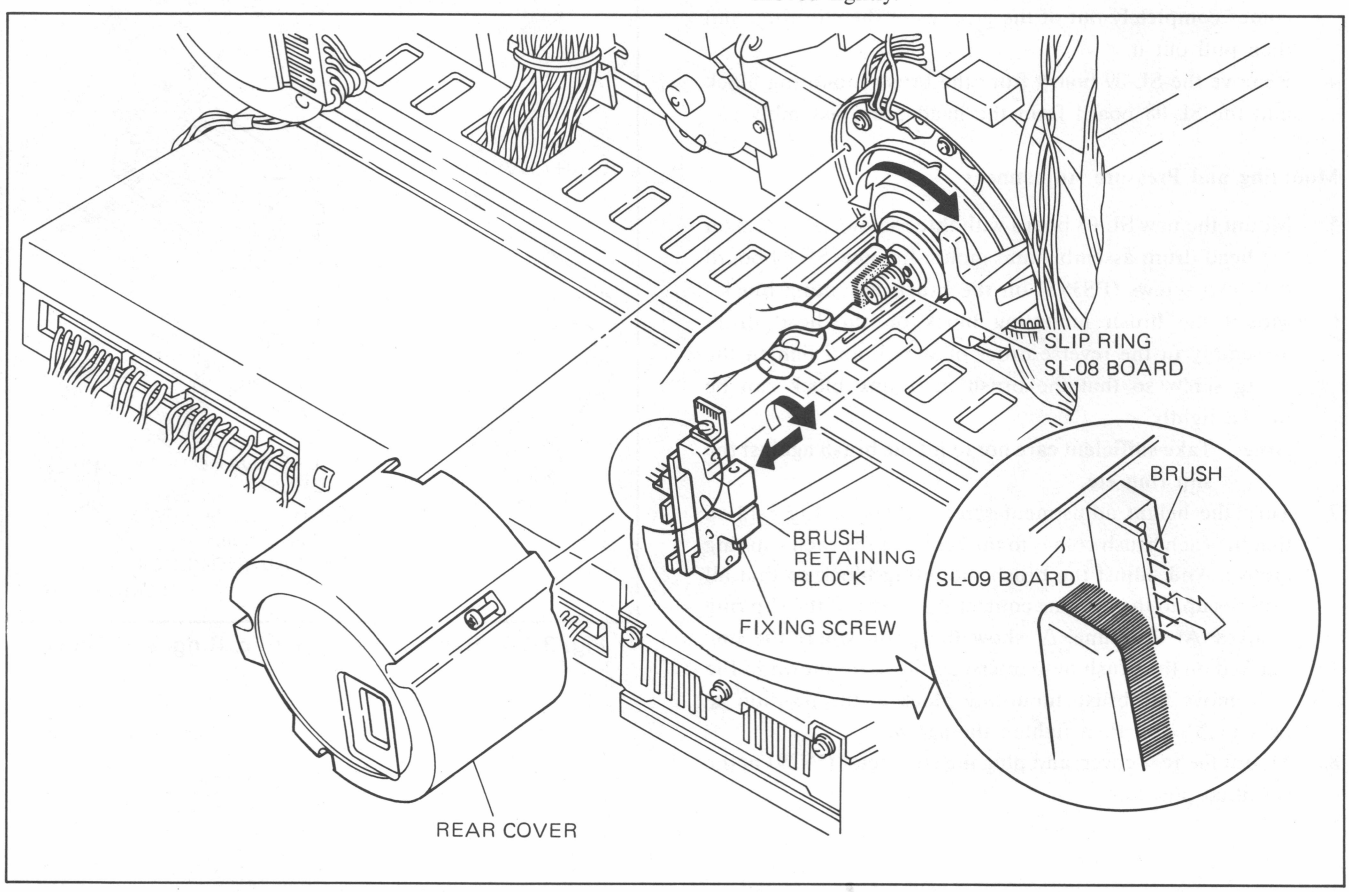


Fig. 3-12. Cleaning of Slip Ring and Brush

8. Turn the height adjustment screw shown in Fig. 3-14 so that the each brush comes to the center of each slip ring groove. And adjust the brush mounting block so that all brushes up to the last one contact the center of the slip ring grooves. At this time, △ shows the point where the line marked on the brush base intersects the scale plate, move the brush retaining block to the position ▲ next to △ , and then tighten the screw.

Noise Check

9. Mount the rear cover, and plug the connector CN291 at the specified position.
10. Play back a recorded tape by the video PLAY head (for BVH-2000/PS/PM) or by the DT head (for BVH-2500/P). And confirm that no slip ring noise appear on the monitor. If the noise still should appear, replace the SL-08 board (slip ring) and the SL-09 board (brush).

3-7-2. Slip Ring and Brush Replacement

Removal

1. Pull out the connector CN291 connected to the head drum assembly.
2. Sufficiently loosen the three screws securing the rear cover to the head drum assembly, and remove the rear cover.
3. Loosen the screw securing the brush mounting block by two turns. Turn the brush mounting block until the brush comes completely out of the grooves of the slip ring, and then pull out it.
4. Remove the SL-09 board from the brush mounting block and the SL-08 board from the head drum assembly.

Mounting and Pressure Adjustment

5. Mount the new SL-08 board with three screws (PS3×12) on the head drum assembly and mount the new SL-09 board with two screws (PS3×8) on the brush mounting block.
6. Mount the brush mounting block on the head drum asssembly in the reverse order of step 3, and tighten the fixing screw so that the brush mounting block can be moved lightly.
   Note: Take sufficient care not to hit the brush against the slip ring etc.
7. Turn the height adjustment screw shown in Fig. 3-14 so that the each brush comes to the center of the each slip ring groove. And adjust the brush mounting block so that all brushes up to the last one contact the center of the slip ring grooves. At this time, △ show the point where the line marked on the brush base intersects the scale shown in Fig 3-13, move the brush mounting block to the position ▲ next to △ , and then tighten the screw.
8. Mount the rear cover, and plug the connector CN291 at the specified position.

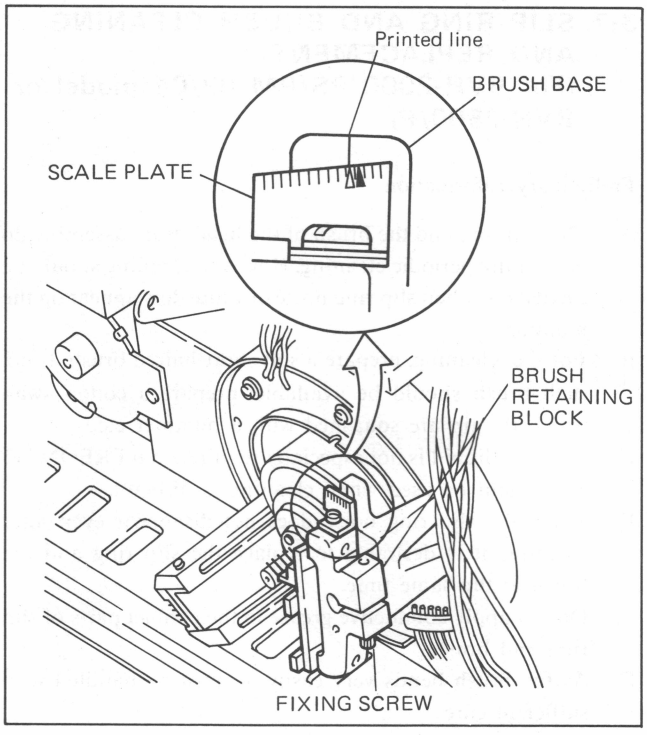


Fig. 3-13. Brush Pressure Adjustment

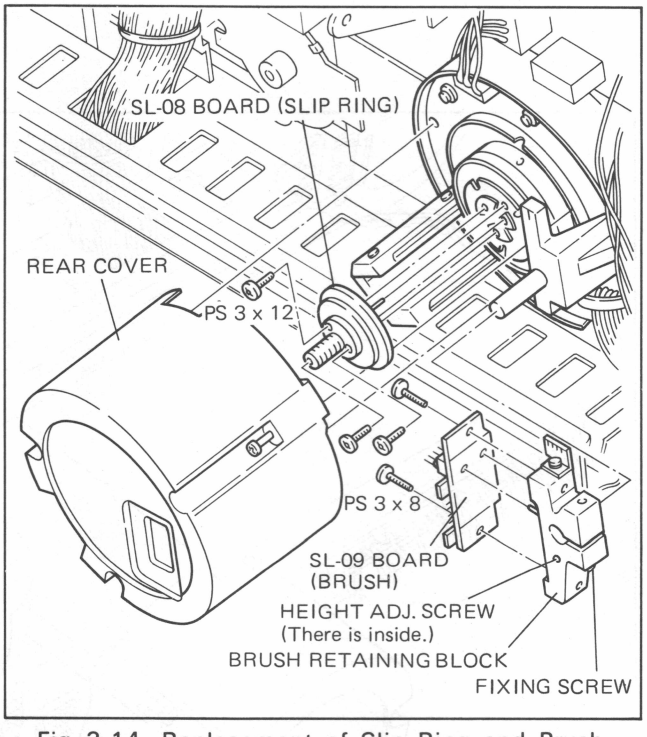


Fig. 3-14. Replacement of Slip Ring and Brush

3-8. REPLACEMENT OF THE SLANT GUIDE ASSEMBLY

Preliminary Information

A. When the guide post of the entrance or exit slant guide assembly has worn out, only the guide post can be replaced (see section 6-6), but the special mounting fixture for replacement is required.

B. For prevention of damage to the rotary heads on the upper drum, and in order to hold the overlap for the RF waveform at the time of mounting, mount so that the clearance between the upper drum and the entrance (or exit) slant guide assembly becomes the specified value.

Note:

Relative position of upper drum, guide flange and guide post of the exit slant guide assembly differs according to the serial number as shown in Fig. 3-15-1.

The exit slant guide assembly supplied as a repair part has following two types.

1 **Type B** which the guide flange is overhung for 0.125 mm from the guide post (SONY part no. A-6046-036-A): Installed in the NTSC model with serial number up to 10099.

2 **Type A** which the guide flange and the guide post are installed in the same plane (SONY part no. A-6046-035-A): Installed in the NTSC model with serial number 10101 and higher and in the PAL model with serial number 10001 & up.

Since these parts are incompatible with each other, after confirming the serial number, replace the assembly.

C. After replacement, perform the tape path alignment, according to the flowchart in section 3-24-1.

3-8-1. Replacement of Entrance Slant Guide Assembly

Removal

1. Turn off power. When the slant guide is closed, turn the threading motor with a flat-blade screwdriver to open the slant guide.
2. Remove the two screws holding the entrance slant guide assembly.
   When the fence is installed on the entrance slant guide assembly, remove it.
3. Clean the surface on the slide base, on which the slant guide assembly was mounted, and the part of the tape contact surface of the lower drum, which was covered by this assembly.

Installation

4. Loosen the setscrew driven into the lower of the taper guide about three turns.
5. Lightly fix the new entrance slant guide assembly with two screws (C3×12) via washers (W3) and spring washers (SW3) as far as possible away from the upper drum.

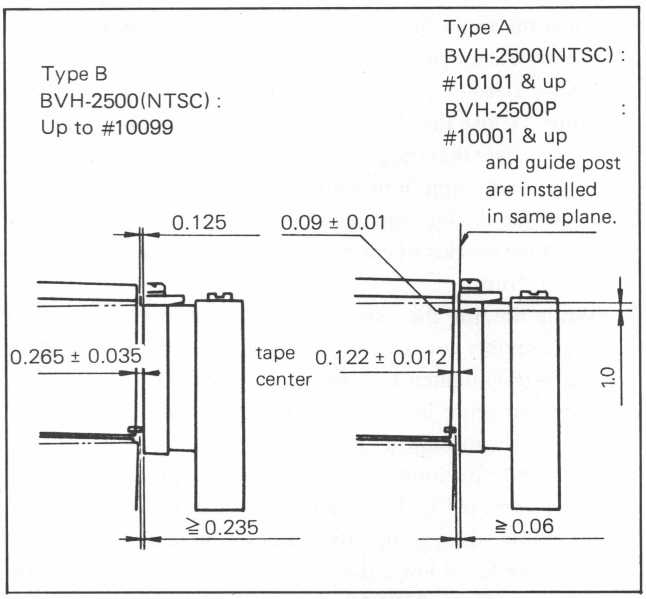


Fig. 3-15-1. Measurements near to Exit Slant Guide

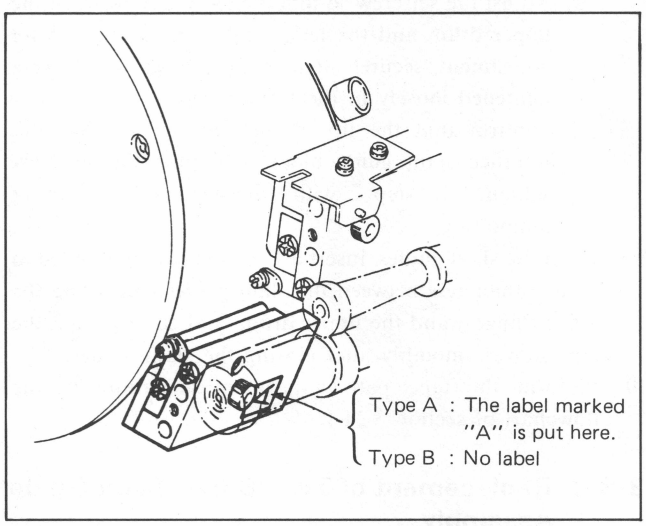


Fig. 3-15-2. Distinction of Exit Slant Guide Type

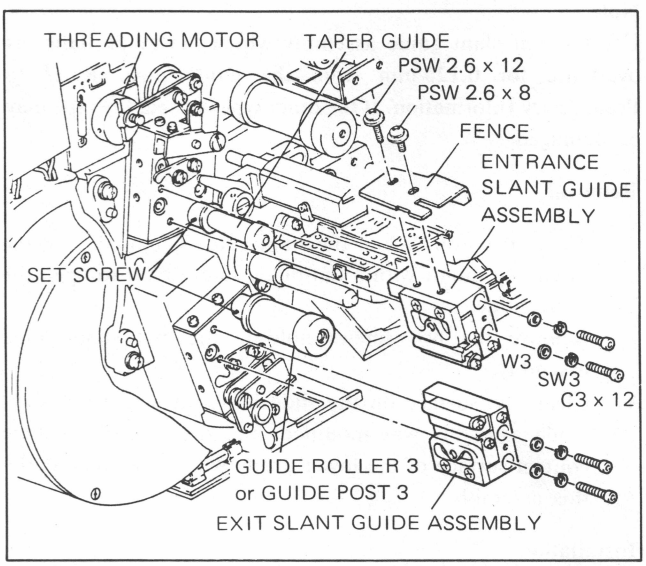


Fig. 3-15-3. Replacement of the Slant Guide Assembly

6. Turn the rotary head of the upper drum to move it away from the slant guides, and stop it. Turn the threading motor with a flat-blade screwdriver to close the slant guides.
   Note: Close the slant guides positively, taking sufficient care that the guide bracket (or the guide post) does not come into contact with the upper drum.
7. Insert the thickness gauge of 0.1 mm in thickness between the guide bracket of entrance slant guide assembly and the upper drum.
   While holding the entrance slant guide assembly so that the assembly contacts with three points marked with ▲ in Fig. 3-16-1, tighten the two screws securely.
8. When the fence had been installed, reinstall the fence and adjust the position as follows.
   ① While pushing the fence in the direction shown by arrow in Fig. 3-16-1 and also pushing it toward the lower drum so that the lower of the fence touches the cylinder of lower drum, and lightly fix the fence with two screws PSW 2.6 × 12 and PSW 2.6 × 8.
   ② Adjust the setscrew so that the clearance between the upper drum and the fence is 0.15 ± 0.05 mm. After adjustment, securely tighten the screws which were tightened loosely in the former step.
   ③ Confirm that the tip of the setscrew touches the entrance slant guide block, and glue the setscrew tightened in step 2 with adhesive like a retaining compound.
9. Open the slant guides, insert a 1 inch video tape folded to double thickness between the slant guides (including the guide flanges) and the upper drum, and confirm that the tape moves smoothly after closing the slant guides.
10. Perform the tape path adjustment according to the flowchart of section 3-24-1.

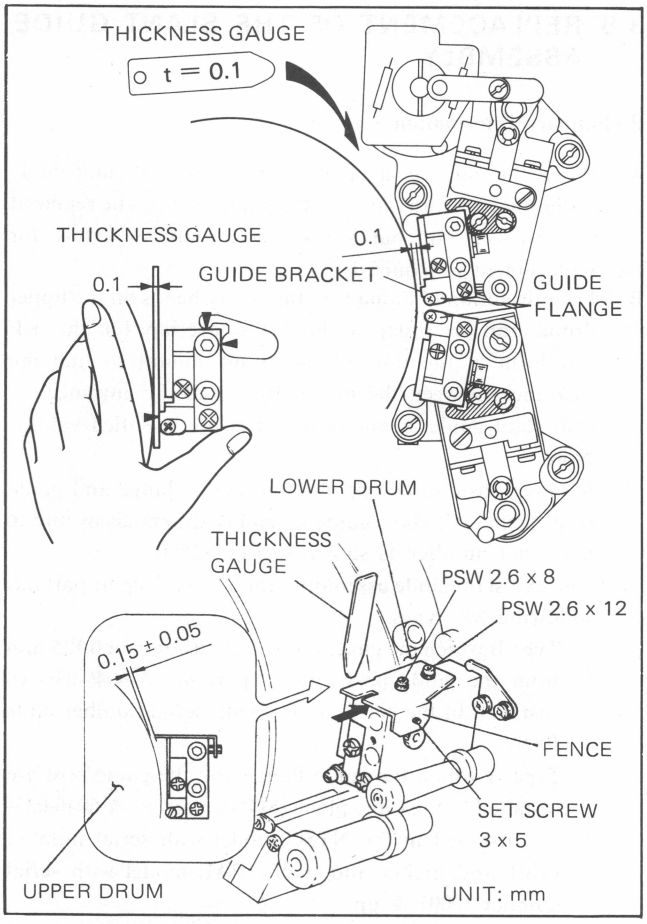


Fig. 3-16-1. Entrance Slant Guide Assy Position Adj.

3-8-2. Replacement of Type B Exit Slant Guide Assembly

Note:
Use the exit slant guide assembly which the guide flange is overhung for 0.125 mm from the guide post. Refer to Preliminary Information. If the other type is used, the tape may be damaged.

Removal

1. Turn off power. When the slant guide is closed, turn the threading motor with a flat-blade screwdriver to open the slant guide.
2. Remove the two screws holding the exit slant guide assembly.
3. Clean the surface on the slide base, on which the slant guide assembly was mounted, and the part of the tape contact surface of the lower drum, which was covered by this assembly.

Installation

4. Loosen the setscrew driven in the lower of the guide post 3 (or guide roller 3) about three turns.

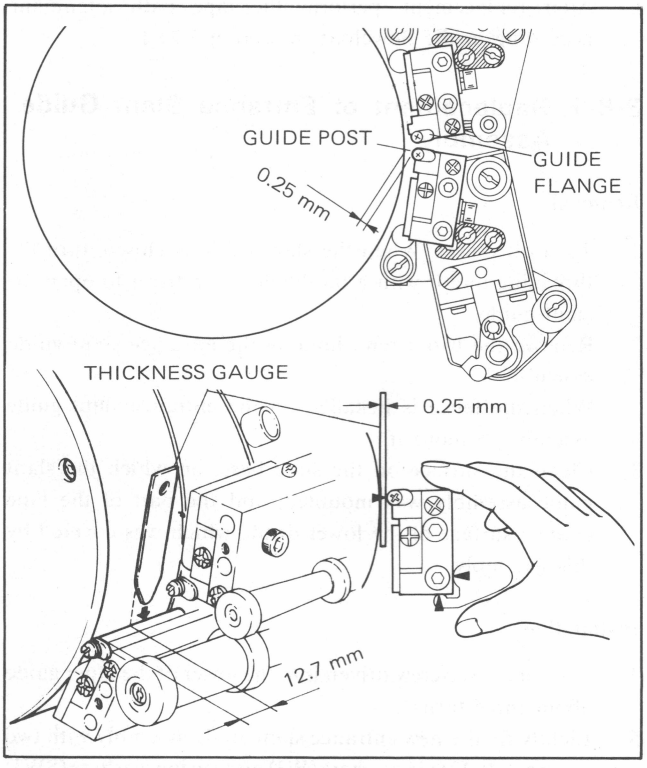


Fig. 3-16-2. Type B Exit Slant Guide Assy Position Adj.

5. Lightly fix the new exit slant guide assembly with two screws (C3 × 12) via washers (W3) and spring washers (SW3) as far as possible away from the upper drum.
6. Turn the rotary head of the upper drum to move it away from the slant guides, and stop it. Turn the threading motor with a flat-blade screwdriver to close the slant guides.
   Note: Close the slant guides positively, taking sufficient care that the guide bracket (or the guide post) does not come into contact with the upper drum.
7. Insert the thickness gauge of 0.25 mm in thickness between the guide post and upper drum.
   While holding the exit slant guide assembly so that the assembly contacts with three points marked with ▲ in Fig. 3-16-2, tighten the two screws securely.
8. Open the slant guides, insert a 1 inch video tape folded to double thickness between the slant guides (including the guide flanges) and the upper drum, and confirm that the tape moves smoothly after closing the slant guides.
9. Perfom the tape path adjustment according to the flowchart of section 3-24-1.

3-8-3. Replacement of Type A Exit Slant Guide Assembly

Note:
Use the exit slant guide which the guide flange and the guide post are installed in the same plane (Refer to the Preliminary Information). If the other type is installed, the upper drum will be damaged.

Removal

1. Turn off power. When the slant guide is closed, turn the threading motor with a flat-blade screwdriver to open the slant guide.
2. Remove the two screws holding the exit slant guide assembly.
3. Clean the surface on the slide base, on which the slant guide assembly was mounted, and the part of the tape contact surface of the lower drum, which was covered by this assembly.

Installation

4. Loosen the setscrew driven into the lower of the guide post 3 about three turns.
5. Lightly fix the new exit slant guide assembly with two screws (C3 × 12) via washers (W3) and spring washers (SW3) as far as possible away from the upper drum.
6. Turn the rotary head of the upper drum to move it away from the slant guides, and stop it. Turn the threading motor with a flat-blade screwdriver to close the slant guides.
   Note: Colse the slant guides positively, taking sufficient care that the guide post does not come into contact with the upper drum.
7. Insert the thickness gauge of 0.09 mm in thickness between upper drum and guide post as shown in the detail of Fig. 3-16-3.
   While holding the exit slant guide assembly so that the assembly contacts with three points marked with ▲ in the figure, tighten the two screws securely.

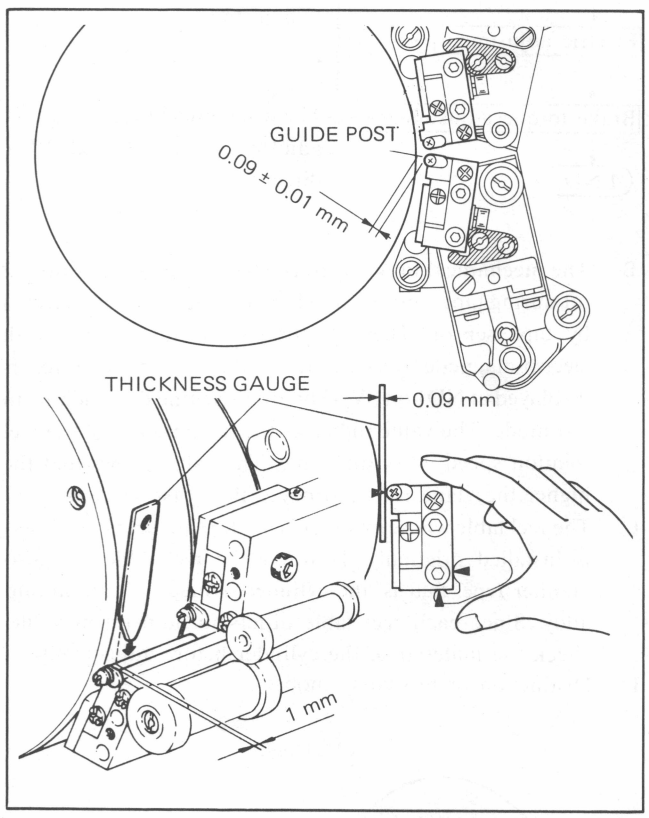
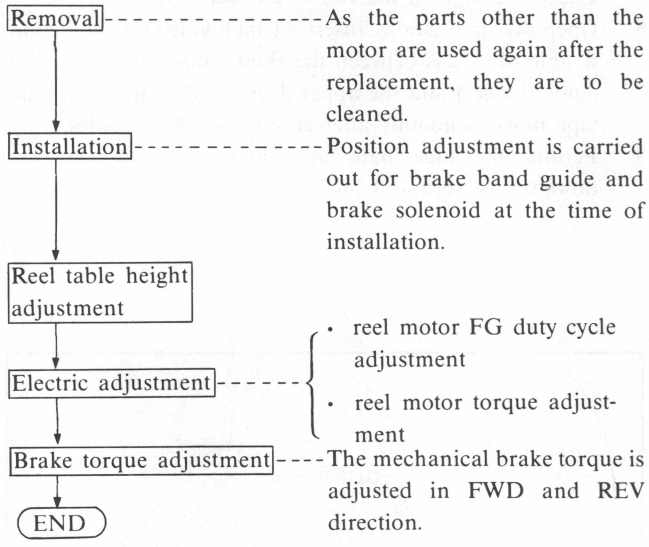


Fig. 3-16-3. Type A Exit Slant Guide Assy Position Adj.

8. Check that the thickness gauge of 0.08 mm in thickness passes through the position shown in the detail of Fig. 3-16-3, and also check that the thickness gauge of 0.10 mm in thickness does not pass.
9. Perform the tape path adjustment according to the folwchart of section 3-24-1.

3-9. REEL MOTOR REPLACEMENT

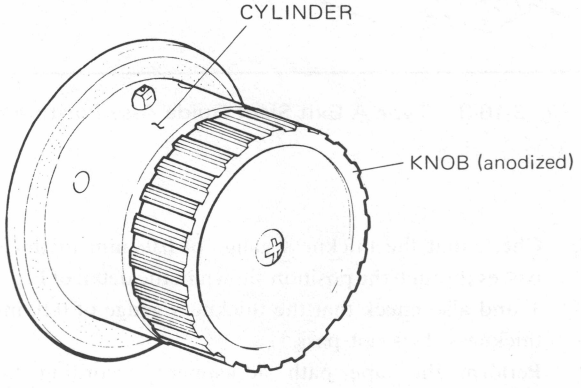
A. Replacement and the subsequent adjustment are carried out as follows.



B. The mechanical brake operats when the power has turned off during tape running or when no tape has been detected by tape sensor. Then the brake operate together with electro-magnetic brake. The synthesized brake force is displayed at ND1 on SV-43 board by setting the machine in test mode. The value indicates the deceleration of the reel rotation speed every unit time. The value shows that the higher the vlaue is, the stronger the brake force is.

C. The reel table whose cylinder is made of nickel plated brass is installed originally. However the reel table has also another type, that is, the cylinder is made of alluminum alloy. Since each reel table differs in adjustment value, check the material of the cylinder before adjustment.

D. Distinction of reel-table knobs



- When the color of the knob and the cylinder is the same: the cylinder is anodized.
- When the color of the cylinder is different from that of the knob: The cylinder is nickel-plated.

E. Prepare the following parts for the adjustment.
① Brake adjustment fixture: Sony part No. J-6043-720-A
For the brake band guide, brake solenoid and link stopper position adjustment.
② Thickness gauge: Sony part No. J-6041-670-A
For the link stopper adjustment.
③ Tape fully wound on to a 9-inch reel.
For the motor torque adjustment.

F. The T reel motor must not be used instead of the S reel motor.

3-9-1. S Reel Motor Replacement

Removal

1. Turn off the power, and remove the front panels. And then pull out the connector CN001 from TT-01 board.
2. Go to the rear of the machine, open the power supply block, and pull out the connectors CN209, CN206, and CN 204 from the RA-05 board. As for CN209, remove the clamp holding its harness.
3. Loosen the two set screws ① shown in Fig. 3-17. While pushing the solenoid plunger by hand, pull out the reel table.
4. Remove the two E rings ②, and remove the brake band.
5. Remove the screw ③, and remove the brake solenoid assembly.
6. Remove each one end of the two springs applied between link stopper and brake links. Remove the E ring ④, and remove the brake links.
7. Remove the three screws ⑤, and remove the brake band guide.
8. Remove the three brake band posts ⑥.
9. Remove the set screw ⑦ and the brake post ⑧ securing the link stopper.
10. Remove the four screws ⑨, and remove the S reel motor.
11. Clean the surfaces of the bosses from which the motor has been removed and the removed parts.

Note: Take sufficient care not to bend the brake band.

Installation

12. Pass the three harnesses of the new reel motor through the hole in the base plate to the rear, and fix the reel motor with the four screws ⑨ (PSW4×16). Go to the rear of the machine, and plug the connectors CN204, CN206, and CN209 at their specified positions on the RA-05 board. Fix the harness of CN209 at the specified position.
13. Fix the link stopper with the brake post ⑧, and then tighten the screw ⑦ (PSW3×8).
14. Install the three brake band posts ⑥.

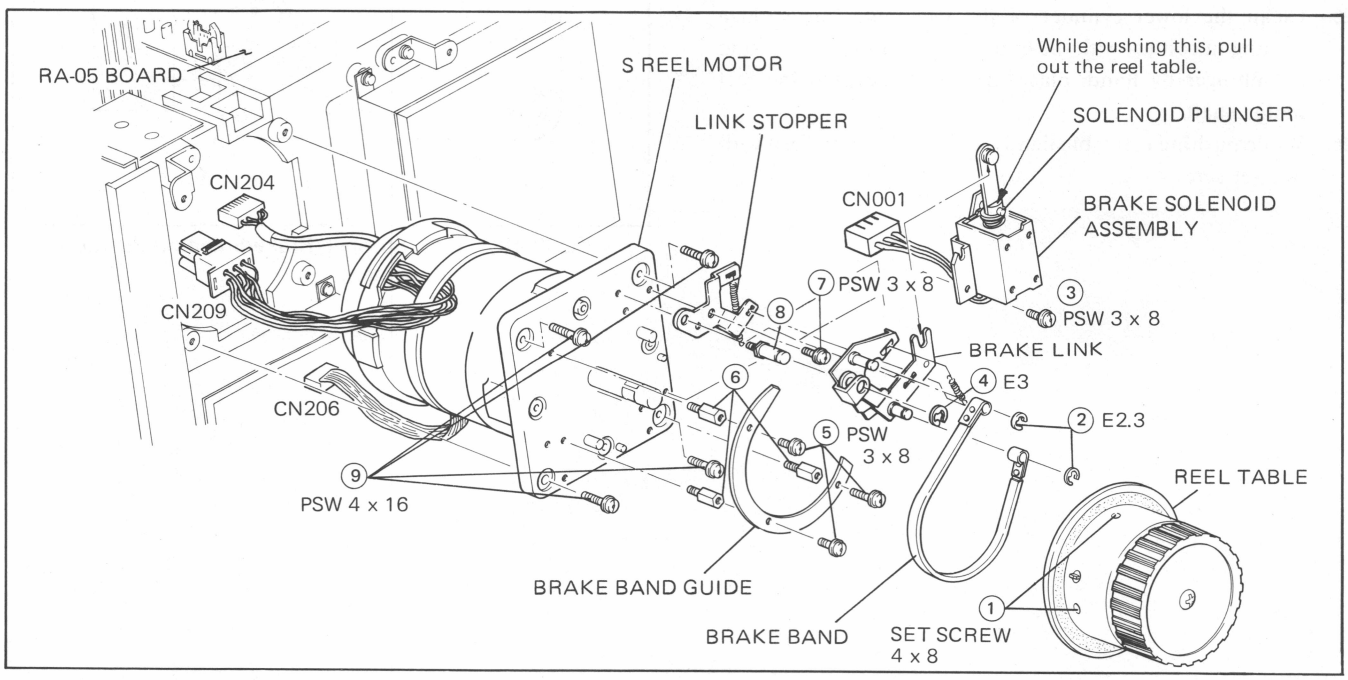


Fig. 3-17. Replacement of the S Reel Motor

Brake Band Guide Position Adjustment

15. Turn the side marked "A, JB-372" of the brake adjustment fixture in front and place it onto the reel motor shaft (see Fig. 3-18).
16. While pressing the brake band guide lightly against the brake adjustment fixture, fix the brake band guide with the three PSW3×8 screws.
17. Remove the brake adjustment fixture.

Link Stopper Position Adjustment

18. Place the brake link onto the brake post and fix it with E-3 ring ④ (see Fig. 3-17).
19. Place the spring between the link stopper and the brake link.
20. Lightly fix the brake solenoid assembly with the screw ③.
21. While pressing the plunger by hand, turn the side "B" of the brake adjustment fixture in front and place it onto the reel motor shaft.
22. Do not push the plunger and adjust the position of the link stopper so that the clearance between the link stopper and the brake link (top) is the value shown in Fig. 3-19.

Brake Solenoid Position Adjustment

23. When the plunger has been pressed, adjust the position of the brake solenoid so that the brake band is not transformed at the "X" and "Y" locations shown in Fig. 3-19, and the clearance between the brake adjustment fixture and the brake band is 0.2 mm or more all along the "Z" location. After the adjustment, fix the brake solenoid with a PSW3×8 screw.
24. While pressing the plunger, remove the brake adjustment fixture.
25. Clean the lower cylinder of the reel table (the surface coming in contact with the brake band) and while pressing the plunger by hand, place the reel table onto the reel motor shaft.
26. While pushing reel table lightly to the reel motor, fix it with two set screws.

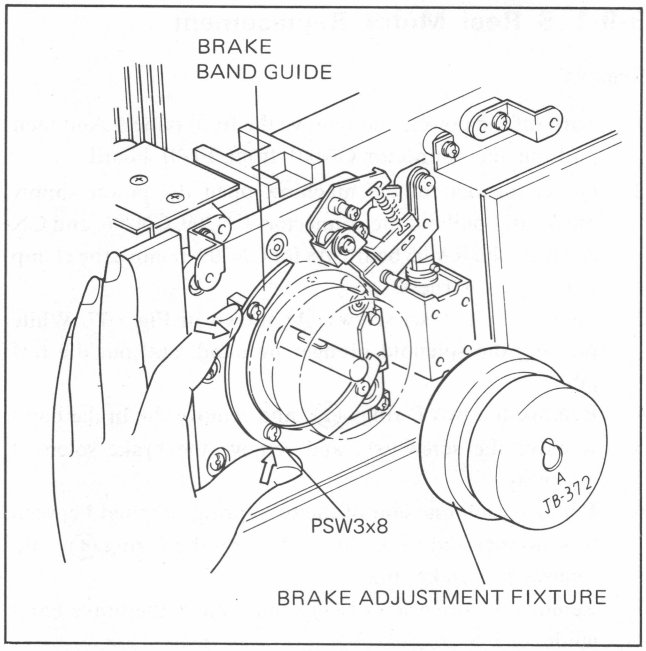


Fig. 3-18. Brake Band Guide Position Adjustment

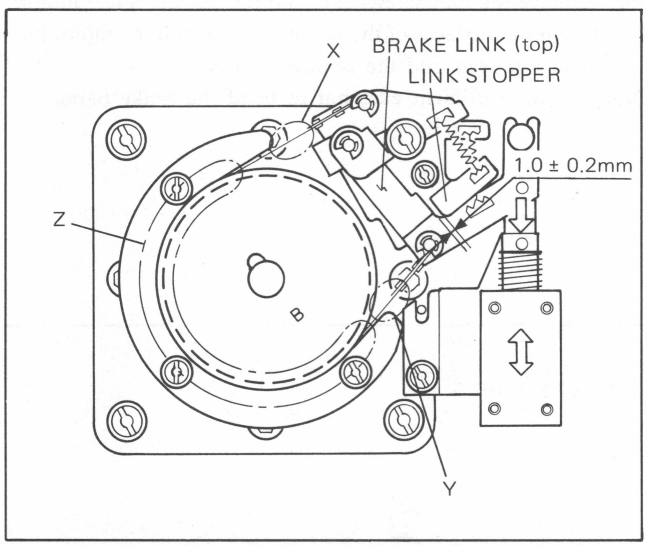


Fig. 3-19. Link Stopper/Brake Solenoid Position Adjustment

Reel Table Height Adjustment

27. Thread a recorded tape free of wrinkles and damages. Confirm that the tape has no strong contact with the reel flange in F.FWD mode. Confirm the same thing also in REW mode. If there should be strong contact, adjust according to the following steps. When the tape curls at a position other than the reel flange, adjust according to section 3-24-2.
28. Adjust the height according to the following sequence.
    a. Remove the tape, cover, and reel washer.
    b. Loosen the two set screws ① securing the reel table, and turn the height adjustment screw shown in Fig. 3-20.

    Note 1: One turn of the adjustment screw changes the height by 0.7 mm.

    Note 2: Turn the adjustment screw as follows.
    - **If the tape contacts the upper reel flange, turn the screw clockwise.**
    - **If the tape contacts the lower reel flange, turn the screw counterclockwise.**

    c. While pushing the reel table lightly against the motor, tighten the two set screws ①. Again confirm the hight of the reel table according to step 27, and then install the reel washer and the cover.

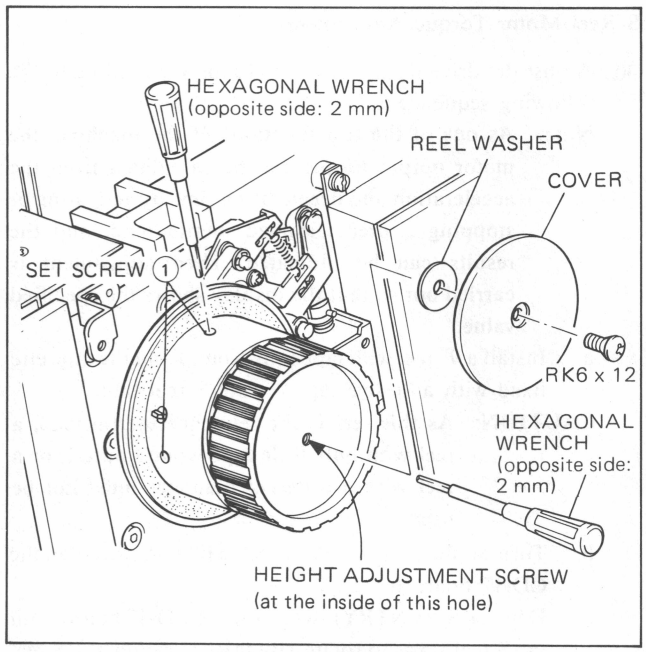


Fig. 3-20. S Reel Table Height Adjustment

FG Duty Cycle Adjustment

29. Adjust as follows so that the motor FG duty cycle in FWD 3 times normal speed is 50%.
    ① Thread a recorded tape.
    ② Turn on the power. Set S4 (TEST-1) switch on the CD-17 board to "1", and depress S7 (ENTRY) switch for at least 0.5 sec.
    ③ Connect an oscilloscope to TP3 on the RL-12 board, and set the machine in FWD 3 times normal speed mode.
    ④ Confirm that the duty cycle of the waveform at TP3 is 50%. If necessary, adjust RV2.
    ⑤ Connect the oscilloscope in the same way to TP14 of the RL-12 board, and confirm that the duty cycle in FWD 3 times normal speed mode is 50%. If necessary, adjust RV4.
    ⑥ Set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec. (This cancels the test mode.)
    ⑦ Remove the tape.

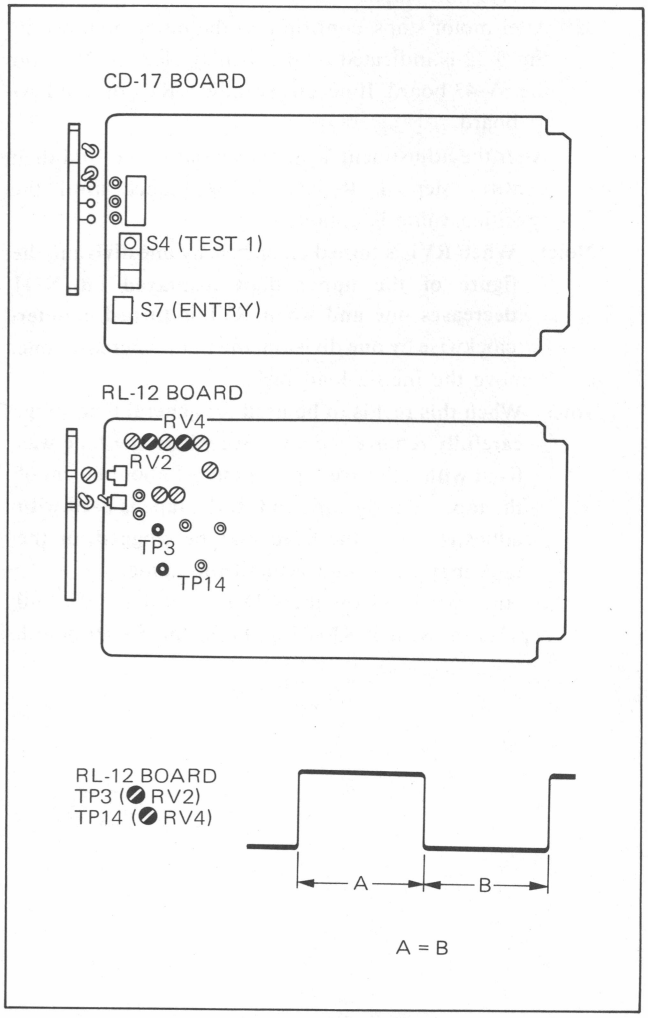


Fig. 3-21. S Reel Motor FG Duty Cycle Adjustment

S Reel Motor Torque Adjustment

30. Adjust the drive torque of the reel motor according to the following sequence.

Note: As one of the test functions of the machine, the motor output torque can be calculated from the acceleration and deceleration time by activating or stopping a predetermined inertia load, and the results can be indicated. Then adjustment is carried out so that the display shows the specified value.

a. Install a 9" reel with tape fully wound and the tape end fixed with adhesive tape on the S reel table.

CAUTION: As this reel is the reference inertia load, a reel with only little tape wound onto it or a reel with a different diameter must not be used.

b. Turn on the power. And set S4 (TEST 1) switch on the CD-17 board to "2".

c. Depress S7 (ENTRY) switch on the CD-17 board until the S reel starts to rotate. (By this operation, the S reel motor automatically executes the sequence of forward, reverse and stop.)

d. After motor stops, confirm that the number shown in Fig. 3-22 is indicated by the display element ND1 on the SV-43 board. If necessary, adjust RV1 on the RA-05 board.

After the adjustment, again carry out step c, and then confirm step d. Repeat this sequence until the specified value is obtained.

Note: When RV1 is turned clockwise by one division, the figure of the upper digit displayed on ND1 decreases one and when RV1 is turned counter-clockwise by one division, the figure increases one.

e. Remove the inertia load reel.

Note: When this reel is to be used for general recording, carefully remove the adhesive where the tape was fixed with adhesive tape, or cut off about 80 cm of the tape from the tape end. If the tape is used with adhesive on it, the head may be clogged, or the tape may be wound around the guide.

f. Set the switch S4 on the CD-17 board to "0", and depress the switch S3 (RESET) on the SY-80 board.

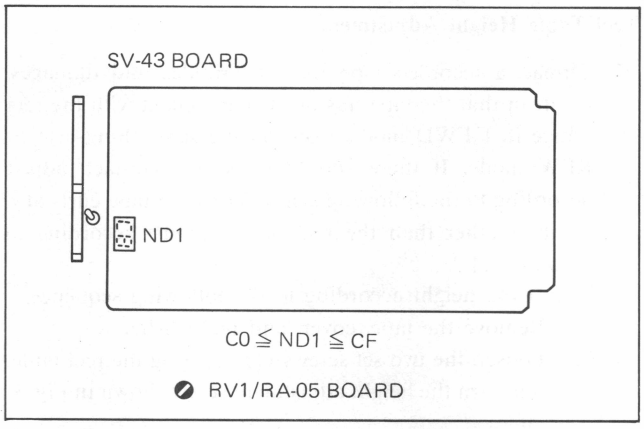


Fig. 3-22. Motor Torque Adjustment Value

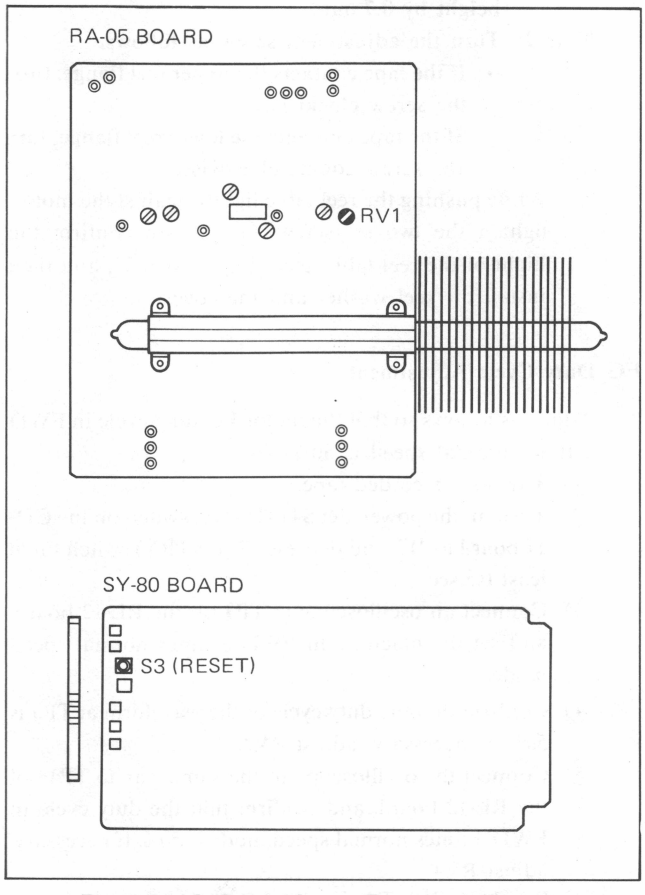


Fig. 3-23. S Reel Motor Torque Adjustment

Mechanical Brake Torque Adjustment

31. Adjust the mechanical brake torque as follows.

① Set the 9-inch empty reel onto the S reel table.

② Turn on the power.

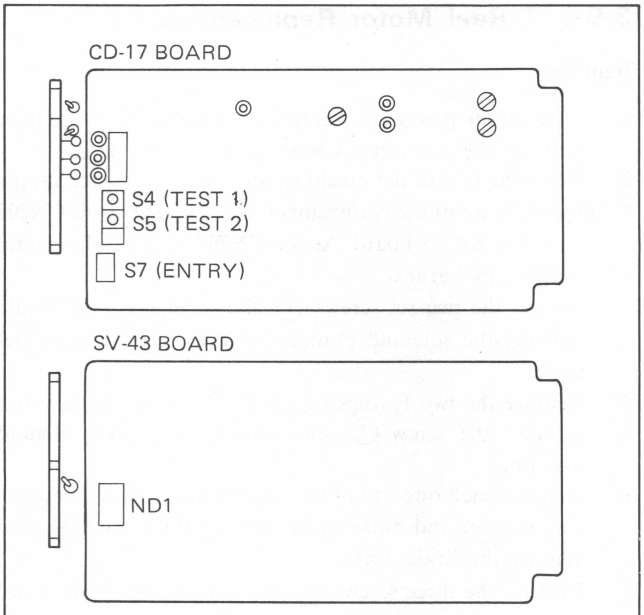
③ Set S4 (TEST-1) switch on the CD-17 board to "4", and measure the REV and FWD brake torque as follows.

Note: The characteristic of the brake is different in the material of the reel-table cylinder and the material can be distinguished by its surface treatment. Before performing the adjustment, check the material of the cylinder. (See item D in the Preliminary Information.)

(i) FWD (CCW) brake torque:
Set S5 (TEST-2) switch on the CD-17 board to "A" and depress S7 (ENTRY) switch for at least 0.5 sec. When the rotation of the reel has stopped, check that the ND1 on the SV-43 board indicates the value shown in Fig. 3-24. If necessary, change the mounting position of the adjustment spring (FWD/CCW).

(ii) REV(CW) brake torque:
Set S5 (TEST-2) switch on the CD-17 board to "B" and depress S7 (ENTRY) switch for at least 0.5 sec. When the rotation of the reel has stopped, check that the ND1 on the SV-43 board indicates the value shown in Fig. 3-24. If necessary, change the mounting position of the adjustment spring (REV/CW).

④ Set the switches S4 and S5 to "0" and release the test mode by pushing S7 for at least 0.5 sec.



ND1 (hexa-decimal display)

direction of tape running (reel rotation)	TEST 1 switch position	TEST 2 switch position	Cylinder surface treatment	
			Ni-plated	anodized
FWD (CCW)	4	A	• 4D ± 7 (46 to 54)	57 ± 7 (50 to 5E)
REV (CW)	4	B	17 ± 3 (14 to 1A)	1A ± 3 (07 to 1D)

Fig. 3-24. Brake Torque

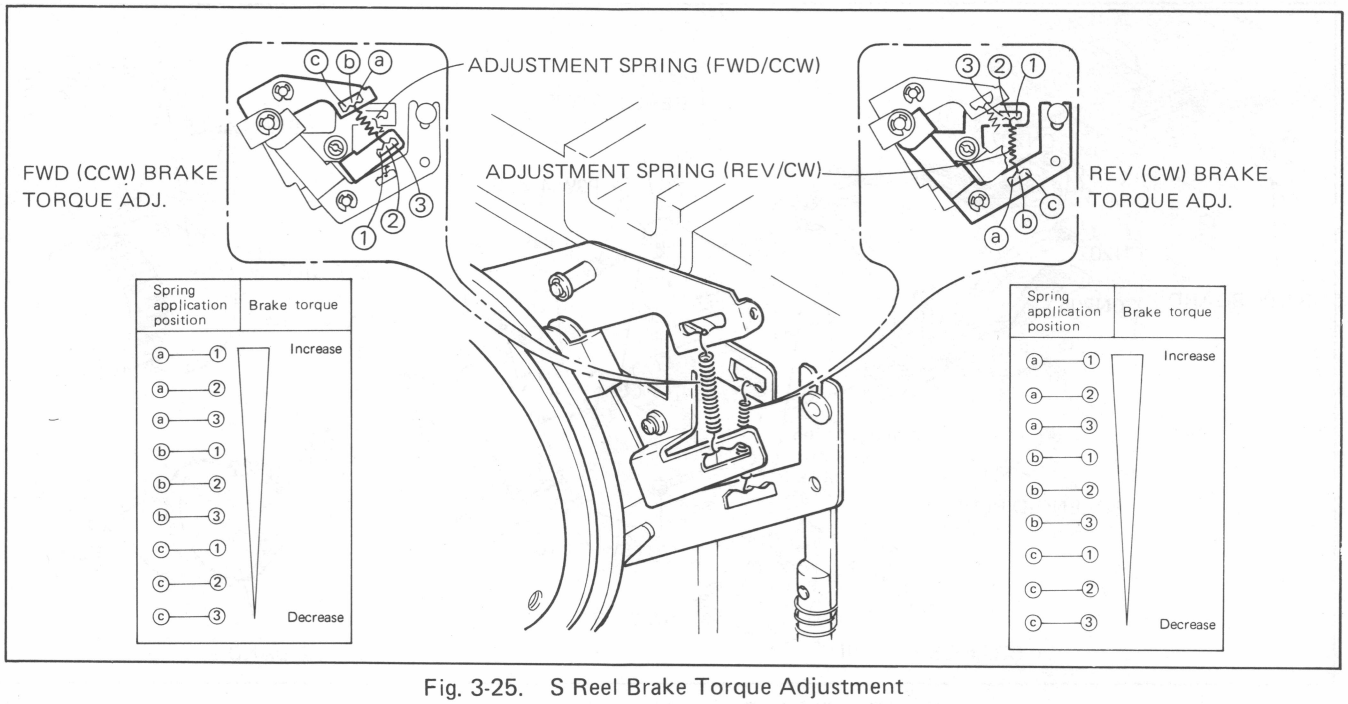


Fig. 3-25. S Reel Brake Torque Adjustment

3-9-2. T Reel Motor Replacement

Removal

1. Turn off the power, and remove the front panels. And then pull out the connector CN002 from TT-01 board.
2. Go to the rear of the machine, and open the power supply block. Pull out the connectors CN207, CN205, and CN202 from the RA-05 board. As for CN207, remove the clamp holding its harness.
3. Loosen the two set screws ① shown in Fig. 3-26. While pushing the solenoid plunger by hand, pull out the reel table.
4. Remove the two E rings ②, and remove the brake band.
5. Remove the screw ③, and remove the brake solenoid assembly.
6. Remove each one end of the two springs installed between link stopper and brake links. Remove the E ring ④, and remove the brake links.
7. Remove the three screws ⑤, and remove the brake band guide.
8. Remove the three brake band posts ⑥.
9. Remove the screw ⑦ and the brake post ⑧ which secure the link stopper.
10. Remove the four screws ⑨, and remove the T reel motor.
11. Clean the surface of the bosses on which the motor was installed and the removed parts.
    Note: Take sufficient care not to bend the brake band.

Installation

12. Pass the three harnesses of the new reel motor through the hole in the base plate to the rear,and fix the reel motor with the four screws ⑨ (PSW4×16). Go to the rear of the machine, and plug the connectors CN202, CN205, and CN207 at their specified positions on the RA-05 board. Fix the harness of the connector CN207 at the specified position.
13. Fix the link stopper with the brake post ⑧, and then tighten the screw ⑦ (PSW3×8).
14. Install the three brake band posts ⑥.

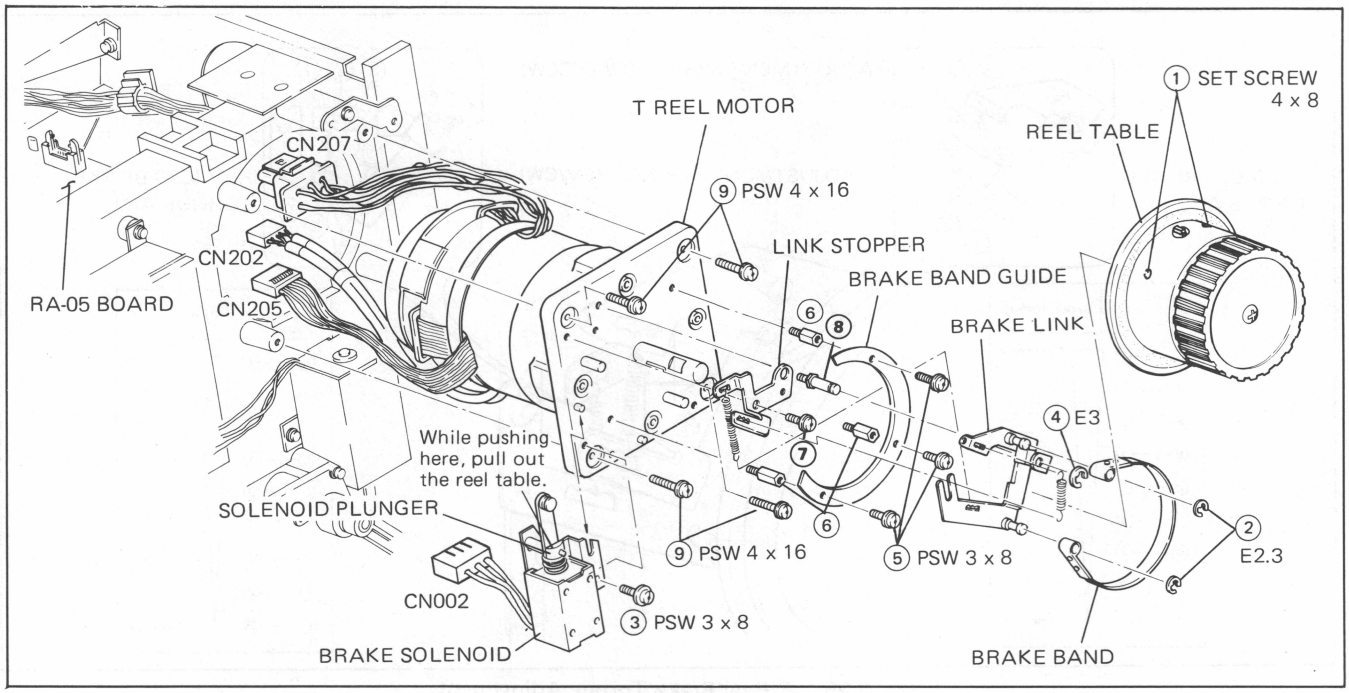


Fig. 3-26. T reel Motor Replacement

Brake Band Guide Position Adjustment

15. Turn the side marked "A, JB-372" of the brake adjustment fixture in front and place it onto the reel motor shaft (see Fig. 3-27).
16. While pressing the brake band guide lightly against the brake adjustment fixture, fix the brake band guide with the three PSW3×8 screws.
17. Remove the brake adjustment fixture.

Link Stopper Position Adjustment

18. Place the brake link onto the brake post and fix it with E ring ④ (see Fig. 3-26).
19. Place the spring between the link stopper and the brake link.
20. Lightly fix the brake solenoid assembly with the screw ③.
21. While pressing the plunger by hand, turn the side "B" of the brake adjustment fixture in front and place it onto the reel motor shaft.
22. Do not push the plunger and adjust the position of the link stopper so that the clearance between the link stopper and the brake link (top) is the value shown in Fig. 3-28.

Brake Solenoid Position Adjustment

23. When the plunger has been pressed, adjust the position of the brake solenoid so that the brake band is not transformed at the "X" and "Y" locations shown in Fig. 3-28, and the clearance between the brake adjustment fixture and the brake band is 0.2 mm or more all along the "Z" location. After the adjustment, fix the brake solenoid with a PSW3×8 screw.
24. While pressing the plunger, remove the brake adjustment fixture.
25. Clean the lower cylinder of the reel table (the surface coming in contact with the brake band) and while pressing the plunger by hand, place the reel table onto the reel motor shaft.
26. While pushing reel table lightly to the reel motor, fix it with two set screws.

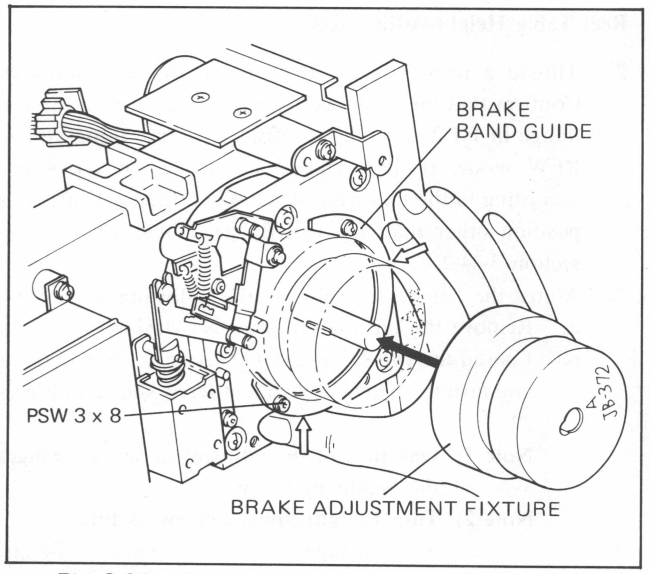


Fig. 3-27. Brake Band Guide Position Adjustment

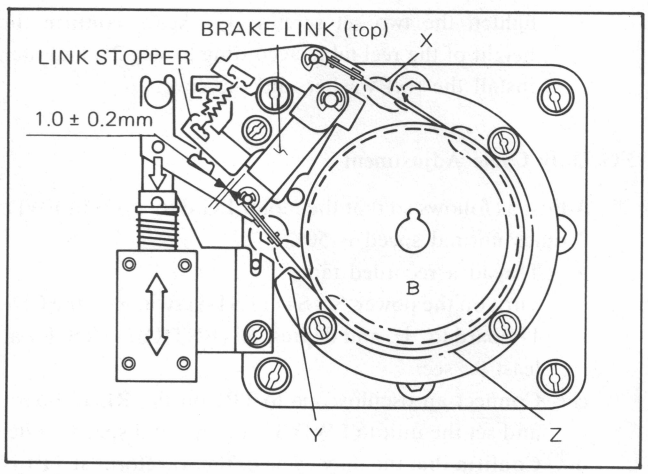


Fig. 3-28. Link Stopper/Brake Solenoid Position Adjustment

Reel Table Height Adjustment

27. Thread a recorded tape free of wrinkles and damages. Confirm that the tape has no strong contact with the reel flange in F.FWD mode. Confirm the same thing also in REW mode. If there should be strong contact, adjust according to the following steps. When the tape curls at a position other than the reel flange, adjust according to section 3-24-2.
28. Adjust the height according to the following sequence.
    a. Remove the tape, cover, and reel washer.
    b. Loosen the two set screws (1) securing the reel table, and turn the height adjustment screw shown in Fig. 3-29.

       Note 1: One turn of the adjustment screw changes the height by 0.7 mm.

       Note 2: Turn the adjustment screw as follows.
       - **If the tape contacts the upper reel flange, turn the screw clockwise.**
       - **If the tape contacts the lower reel flange, turn the screw counterclockwise.**

    c. While pushing the reel table lightly against the motor, tighten the two set screws (1). Again confirm the height of the reel table according to step 27, and then install the reel washer and the cover.

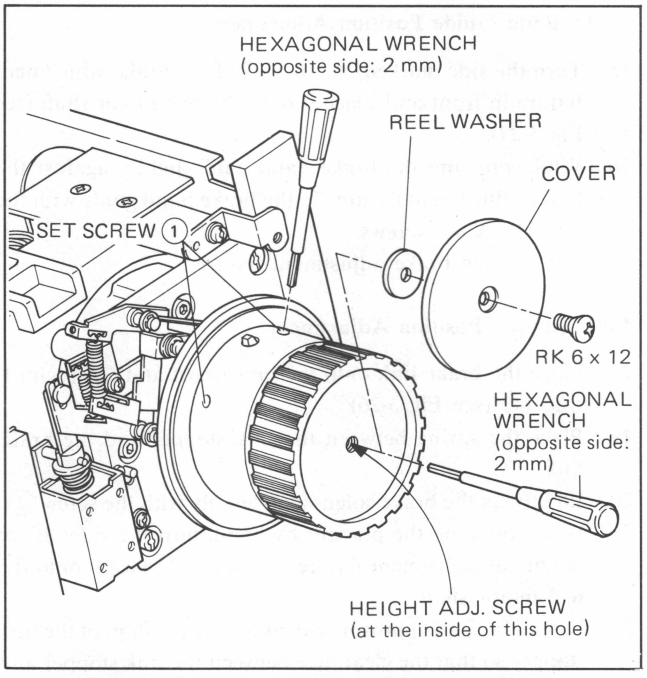


Fig. 3-29. T Reel Table Height Adjustment

FG Duty Cycle Adjustment

29. Adjust as follows so that the motor FG duty cycle in FWD 3 times normal speed is 50%.
    a. Thread a recorded tape.
    b. Turn on the power. Set S4 (TEST-1) switch on the CD-17 board to "1", and depress S7 (ENTRY) switch for at least 0.5 sec.
    c. Connect an oscilloscope to TP1 on the RL-12 board and set the unit to FWD 3 times normal speed mode.
    d. Confirm that the duty cycle of the waveform at TP1 is 50%. If necessary, adjust RV6.
    e. Connect the oscilloscope in the same way to TP2 of the RL-12 board, and confirm that the duty cycle in FWD 3 times normal speed mode is 50%. If necessary, adjust RV5.
    f. Set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec. (This cancels the test mode.)
    g. Remove the tape.

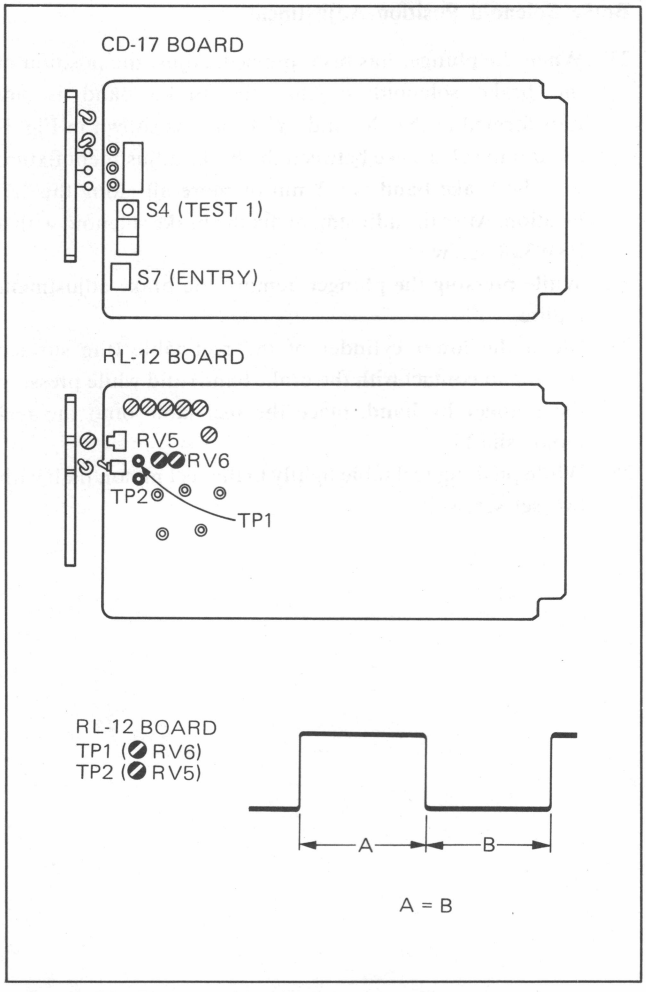


Fig. 3-30. T Reel Motor FG Duty Cycle Adjustment

T Reel Motor Torque Adjustment

30. Adjust the drive torque of the reel motor according to the following sequence.

Note: As one of the test functions of the machine, the motor output torque can be calculated from the acceleration and deceleration time by starting and stopping predetermined inertia load, and the results can be indicated. Then adjustment is carried out so that the display shows the specified value.

a. Install a 9 inch reel with tape fully wound and the tape end fixed with adhesive tape on the T reel table.

CAUTION: As this reel is the reference inertia load, a reel with only little tape wound onto it or a reel with a different diameter must not be used.

b. Turn on the power, and set S4 (TEST 1) switch on the CD-17 board to "3".

c. Depress S7 (ENTRY) switch on the CD-17 board until the T reel starts to rotate. (By this operation, the T reel motor automatically executes the sequence of forward, reverse, and stop.)

d. After motor stop, confirm that the number shown in Fig. 3-31 is indicated by the display element ND1 on the SV-43 board. If necessary, adjust RV6 on the RA-05 board.

After the adjustment, again carry out step c, and then confirm step d. Repeat this sequence until the specified value is obtained.

Note: When RV6 is turned clockwise by one division, the figure of the upper digit displayed on ND1 decreases one and when RV6 is turned counter-clockwise by one division, the figure increases one.

e. Remove the inertia load reel.

Note: When this reel is to be used for general recording, carefully remove the adhesive where the tape was fixed with adhesive tape, or cut off about 80 cm of the tape from the tape end. If the tape is used with adhesive on it, the head may be clogged, or the tape may be wound around the guides.

f. Set the switch S4 on the CD-17 board to "0", and depress the switch S3 (RESET) on the SY-80 board.

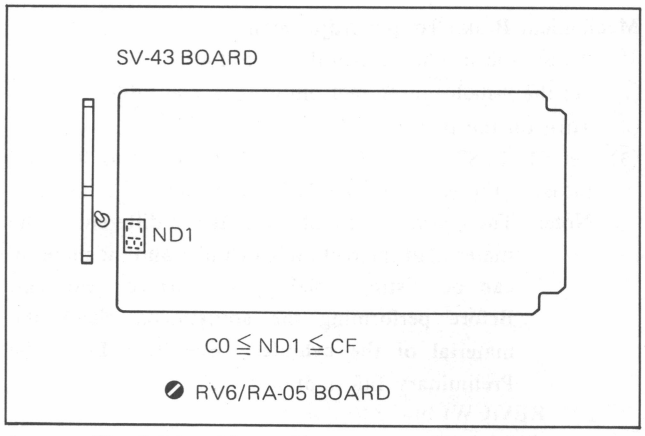


Fig. 3-31. Motor Torque Adjustment Value

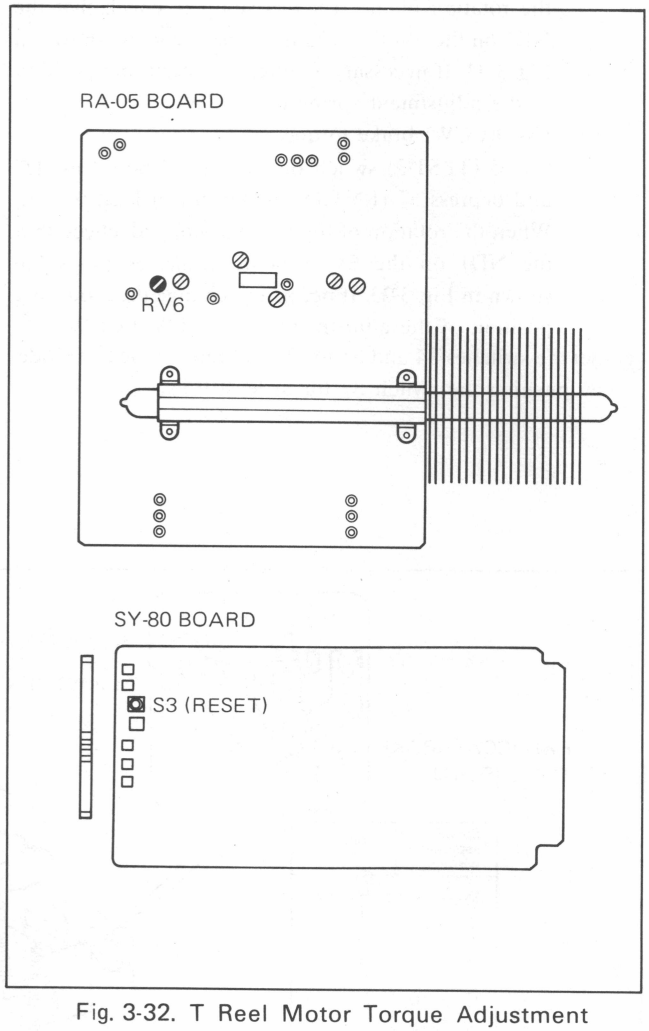


Fig. 3-32. T Reel Motor Torque Adjustment

Mechanical Brake Torque Adjustment

31. Adjust the mechanical brake as follows.

① Set the 9-inch empty reel onto the T reel table.

② Turn on the power.

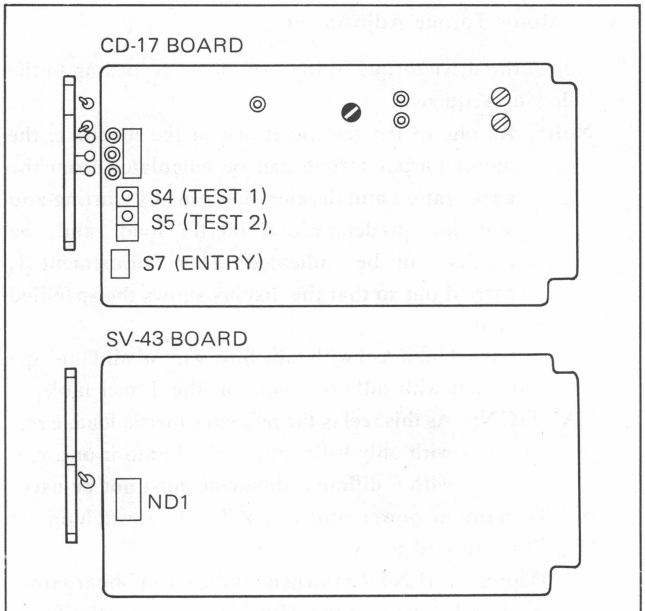
③ Set S4 (TEST-1) switch on the CD-17 board to "4", and measure the REV and FWD brake torque as follows.

Note: The characteristic of the brake is different in the material of the reel-table cylinder and the material can be distinguished by its surface treatment. Before performing the adjustment, check the material of the cylinder. (See item D in the Preliminary Information.)

(i) REV(CW) brake torque:
Set S5 (TEST-2) switch on the CD-17 board to "C" and depress S7 (ENTRY) switch for at least 0.5 sec. When the rotation of the reel has stopped, check that the ND1 on the SV-43 board indicates the value shown in Fig. 3-33. If necessary, change the mounting position of the adjustment spring (REV/CW).

(ii) FWD(CCW) brake torque:
Set S5 (TEST-2) switch on the CD-17 board to "D" and depress S7 (ENTRY) switch for at least 0.5 sec. When the rotation of the reel has stopped, check that the ND1 on the SV-43 board indicates the value shown in Fig. 3-33. If necessary, change the mounting position of the adjustment spring (FWD/CCW).

④ Set the switches S4 and S5 to "0" and release the test mode by pushing the switch S7 for at least 0.5 sec.



ND1 (hexa-decimal display)

direction of tape running (reel rotation)	TEST 1 switch position	TEST 2 switch position	Cylinder surface treatment	
			Ni-plated	anodized
REV (CW)	4	C	4D ± 7 (46 to 54)	57 ± 7 (50 to 5E)
FWD (CCW)	4	D	17 ± 3 (14 to 1A)	1A ± 3 (07 to 1D)

Fig. 3-33. Brake Torque

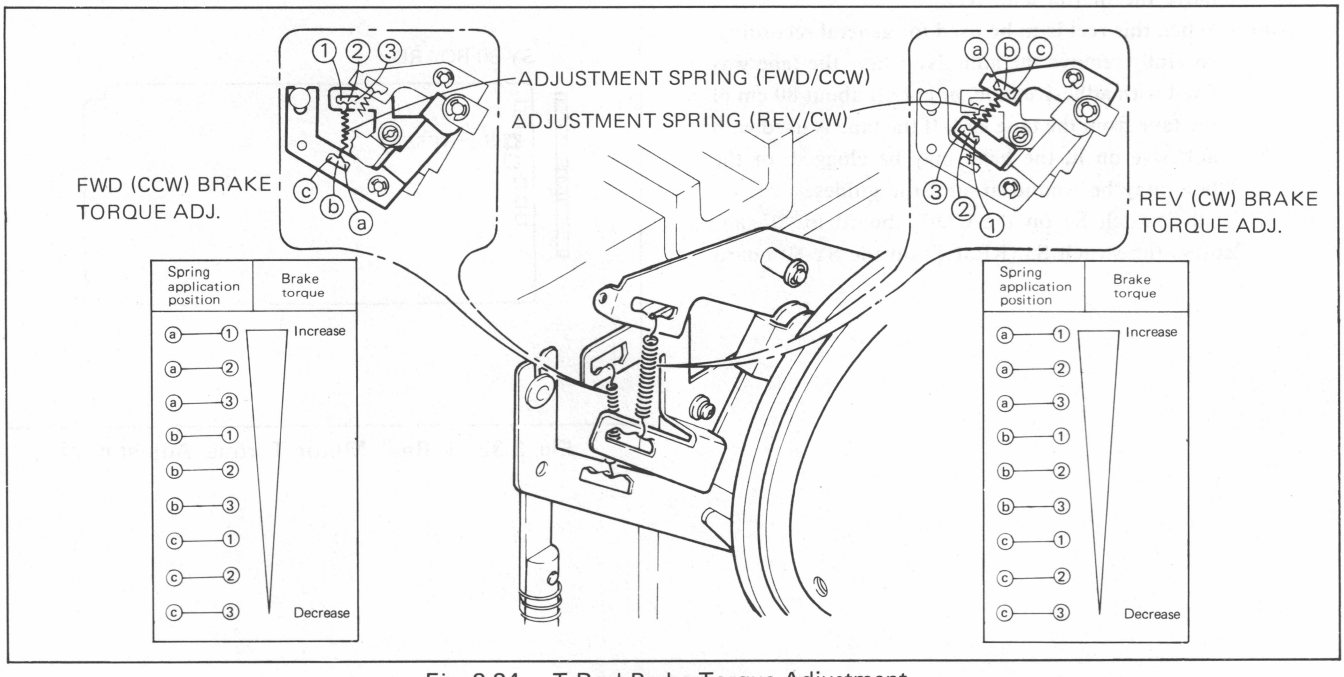


Fig. 3-34. T Reel Brake Torque Adjustment

3-10. BRAKE BAND REPLACEMENT

Preliminary Information

A. The mechanical brake works when the power is off or the tape is not threaded. When the brake torque is adjusted correctly, the reel may be stopped without damage to the tape even if the power is turned off during tape running.
B. When the mechanical brake torque can not be adjusted with any application position of the adjustment spring, the brake band must be replaced.
C. Brake band replacement and the subsequent adjustment after the replacement are carried out according to the following sequence.

Removal
↓
Installation
↓
Mechanical brake torque adjustment ----Adjust by performing step 31 in section 3-9-1 ("S" side) or 3-9-2 ("T" side).
↓
Reel table height confirmation
↓
End

Removal

1. Loosen the two set screws shown in Fig. 3-35. While attracting the solenoid plunger, remove the reel table. Clean the cylindrical part at the lower part of the reel table, which has been in contact with the brake band.
2. Remove the two E rings, and remove the brake band.

Installation

3. Install the new brake band in the position shown in Fig. 3-35 (a), and fasten it with the two E rings (E2.3).
4. While pressing the plunger, place the brake adjustment fixture ("B" mark faces the front) onto the reel motor shaft as shown in Fig. 3-35 (b).
5. While not pressing the plunger, check that the clearance between the link stopper and the brake link (top) is 1.0 ± 0.2 mm. If it is not within specifications, adjust the position of the link stopper.
6. While pressing the plunger, remove the brake adjustment fixture and place the reel table. While pushing the reel table to the reel motor, tighten the two set screws.

Mechanical Brake Torque Adjustment

7. Adjust the mechanical brake torque according to the instructions of "Preliminary Information".

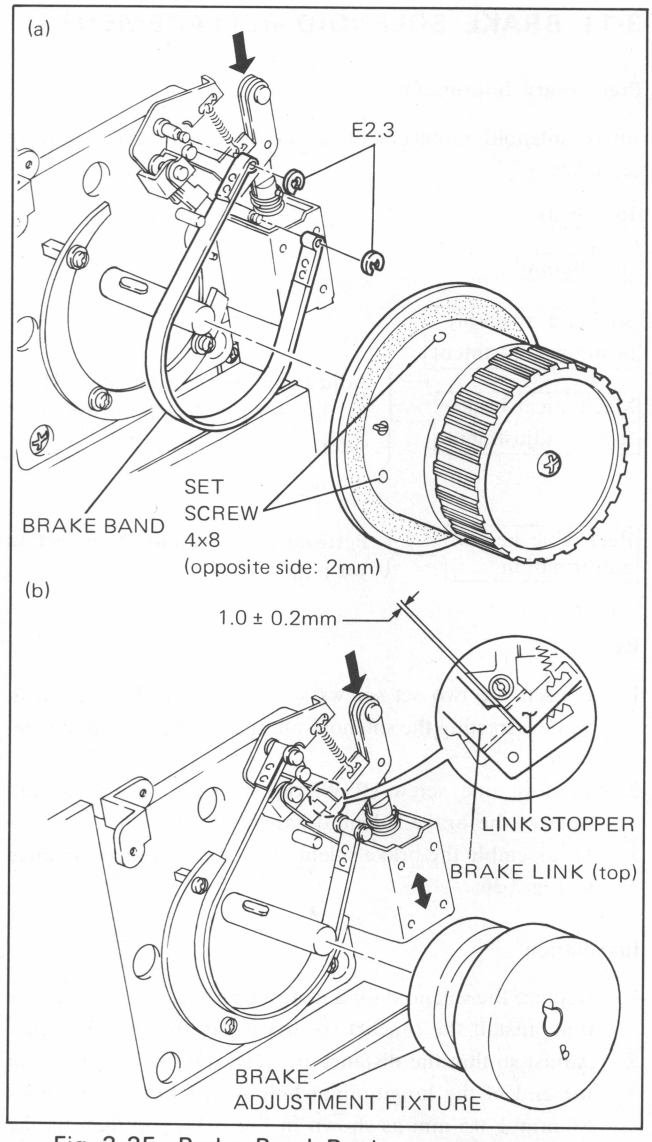


Fig. 3-35. Brake Band Replacement

Reel Table Height Confirmation

8. Thread a recorded tape free of wrinkles and damages. Confirm that the tape has no strong contact with the reel flange in F.FWD mode. Confirm the same thing also in REW mode. If there should be strong contact, adjust according to section 3-24-2.

3-11. BRAKE SOLENOID REPLACEMENT

Preliminary Information

Brake solenoid replacement is carried out in the following sequence.

Removal
↓
Installation
↓
Solenoid assembly position adjustment
↓
Mechanical brake torque adjustment ---- { Adjust by performing step 31 in Section 3-9-1 ("S" side) or 3-9-2 ("T" side).
↓
Reel table height confirmation ---- { Perfrom steps 27 and 28 of section 3-9-1 or 3-9-2.
↓
END

Removal

1. Loosen the two set screws securing the reel table. Next, while attracting the solenoid plunger by hand, pull the reel table.
2. Remove one screw (PSW3×8) shown in Fig. 3-36, and remove the brake solenoid assembly.
3. Disassemble the brake solenoid assembly under reference to Fig. 3-36.

Installation

4. Replace the solenoid for a new one and reassemble. At this time, install the bracket so that it can be moved lightly.
5. Adjust so that the distance between the solenoid pin and the end of the longitudinal hole of the bracket becomes 5.0 mm ± 0.5 mm as shown in Fig. 3-37, and then fix the bracket securely.
6. Lightly fix the solenoid assembly with one screw (PSW3×8) in the position shown in Fig. 3-36.

Solenoid Assembly Position Adjustment

7. While pressing the plunger, place the brake adjustment fixture ("B" mark faces the front) onto the reel motor shaft.
8. When the plunger has been pressed, adjust the position of the brake solenoid so that the brake band is not transformed at the "X" and "Y" shown in Fig. 3-38, and the clearance between the brake band and the brake adjustment fixture is 0.2 mm or more along the "Z". After the adjustment, fix the brake solenoid firmly with a PSW3×8 screw.
9. While pressing the plunger, remove the brake adjustment fixture and place the reel table onto the reel motor shaft.
10. While pushing the reel table to the reel motor, tighten two set screws.
11. Check the mechanical brake torque and the reel table height in accordance with the instructions of the above "Preliminary Information".

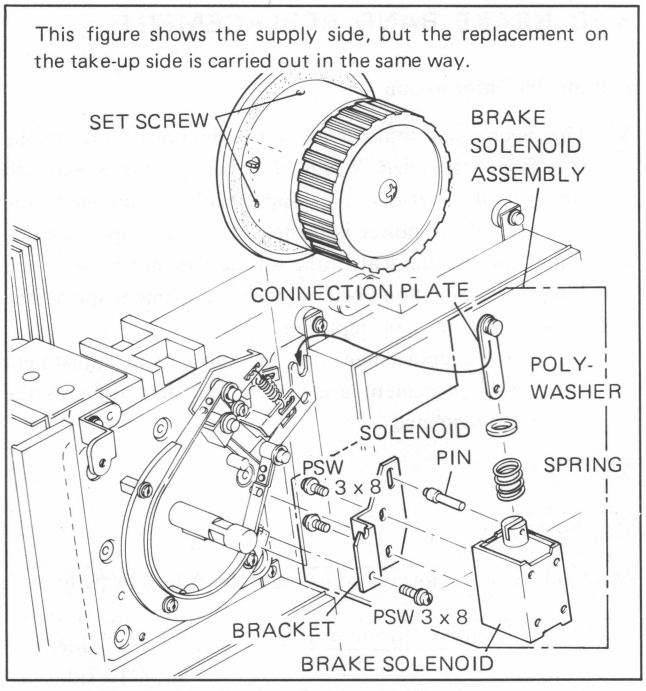


Fig. 3-36. Brake Solenoid Replacement

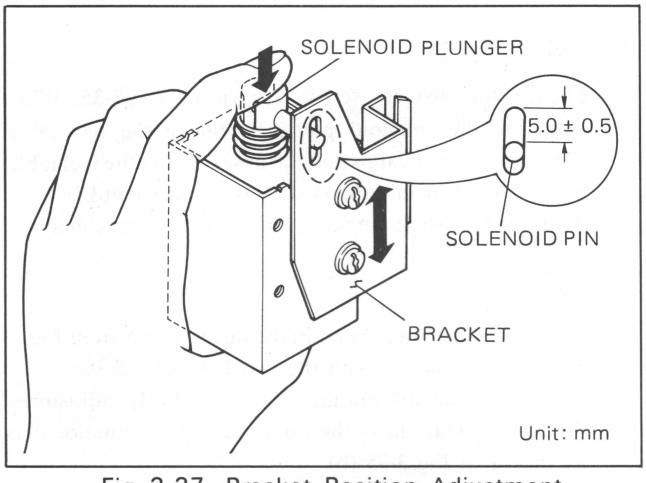


Fig. 3-37. Bracket Position Adjustment

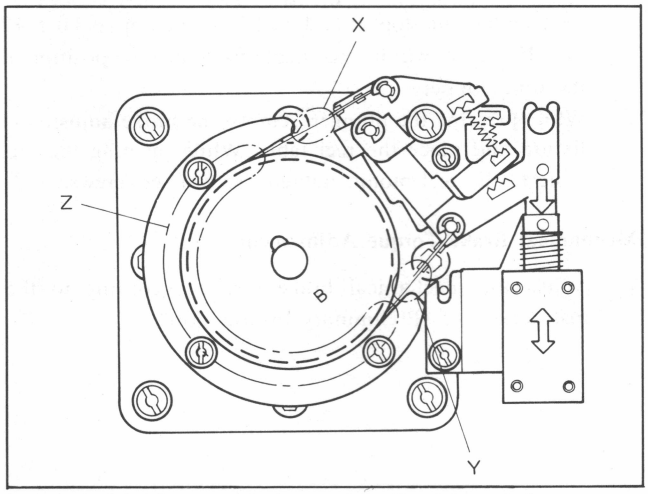


Fig. 3-38. Solenoid Assembly Position Adjustment

3-12. REPLACEMENT OF THE S-TENSION ARM ASSEMBLY

Preliminary Information

A. If the tape tension (FWD back tension) may not be adjusted correctly, the S-tension arm assembly should be replaced. When the wear of the guide shaft is the cause that the correct tape tension is not obtained, replace the guide shaft or turn the worn surface (see section 6-5).
B. As the tension spring used for the S-tension arm assembly has a large influence onto the tape tension, the hook part must not be bent, and only the specified spring must be used for replacement.
C. After replacement of the S-tension arm assembly, adjust the tape tension and confirm the tape path condition.
D. Take care that no excessive force acts onto the potentiometer.
E. For the tape tension adjustment, prepare a tension adjustment tool (part No. J-6043-120-A) and a digital volt meter.

Replacement

1. Pull out the connector CN003 from the TT-01 board.
2. For PS or P model, remove the screw B3×6 and remove the balance weight.
3. Remove the two screws (PS3×16) shown in Fig. 3-39. Remove the S-tension arm assembly, and install a new one.
4. For PS or P model, mount the balance weight with the screw (B3×6).

Tape Tension Adjustment

5. Put the S-arm adjustment weight (marked S85) of the tension adjustment tool onto the guide shaft of the tension arm. Raise the arm slightly by hand, and then release it quietly. Bring the arm into free vibration, and wait until it stops.
6. Connect a digital voltmeter to TP12 on the RL-12 board. And turn on the power of VTR.
7. Confirm that the voltage at TP12 is 0V ± 30mV. If necessary, adjust RV12 on the RL-12 board.
8. Confirm that the voltage at TP12 is −2.6V ± 0.15V when the weight is removed from the S-tension arm. If necessary, adjust RV1 on the TT-01 board.
   Attach the weight again and perform steps 5 and 7. Repeat steps 5, 7 and 8 until both the specifications are satisfied without any adjustment.

Tape Path Confirmation

9. Remove the weight, thread a tape, and set the machine in REC mode. Confirm that the tape does not curl near the guide rollers 1 and 2. If the tape should curl, adjust according to section 3-24-2. Confirm in the same way for the modes F.FWD, REV ×1 program JOG, and REW.

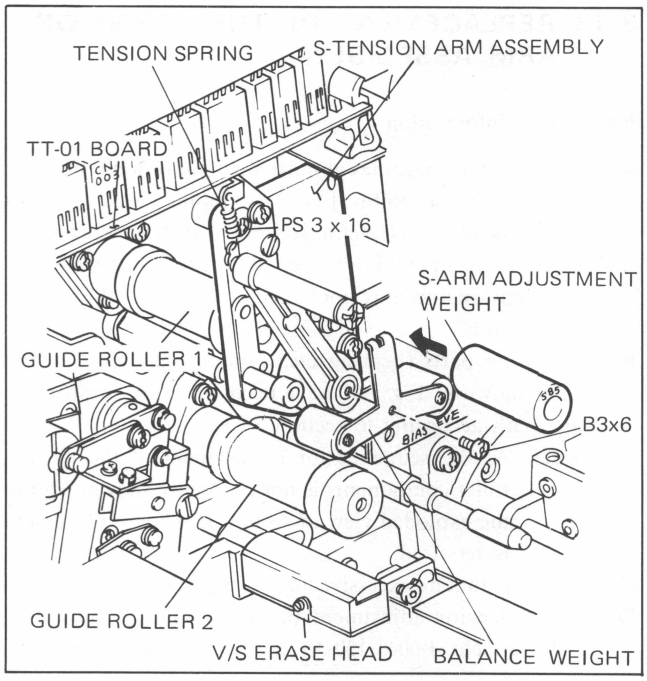


Fig. 3-39. S Tension Arm Replacement

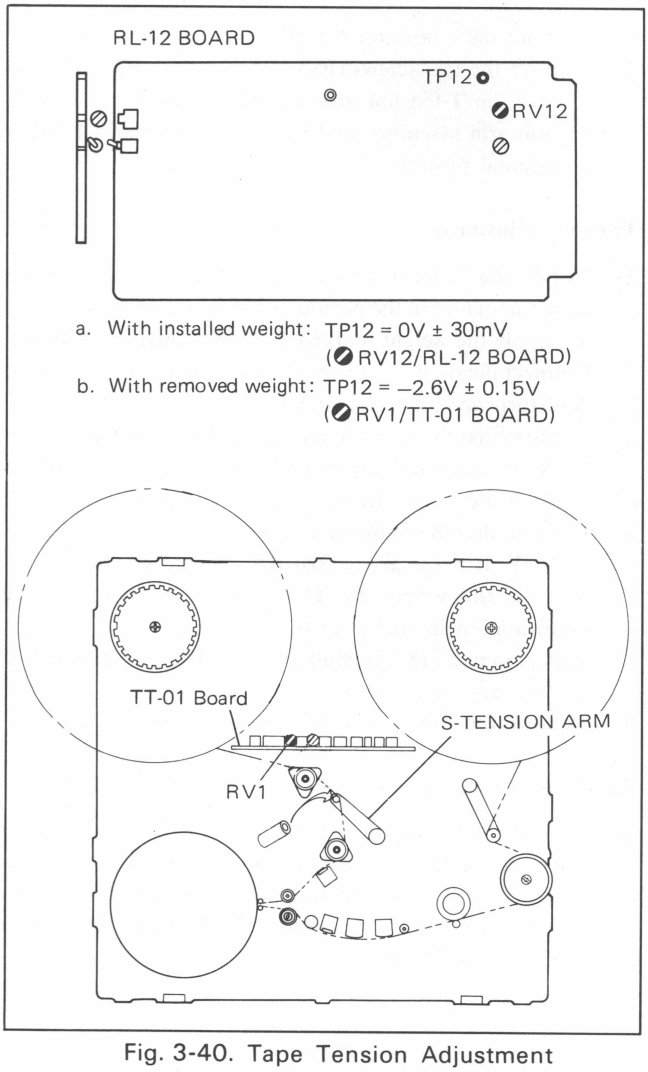


Fig. 3-40. Tape Tension Adjustment

3-13. REPLACEMENT OF THE T-TENSION ARM ASSEMBLY

Preliminary Information

A. When the tape becomes abnormally tight or loose near the T-tension arm assembly, first the damping speed of the air damper is adjusted (refer to section 3-14). Next, the tension of the T-tension arm is adjusted (steps 3 to 7 of this section). If the tension arm may not be adjusted, replace the tension arm assembly.

B. When the parts (bearing etc.) composing the T-tension roller shown in Fig. 3-41 have been replaced, confirm the tape path according to section 3-24-2.

Note: As the sequence for replacement of the tension roller components is not especially shown, refer to the exploded view in section D when replacement is required.

C. Take care that no excessive force acts on the potentiometer.

D. For the tension adjustment, prepare a tension adjustment tool (part No. J-6043-120-A) and a digital voltmeter.

Replacement

1. Pull out the connector CN004 from TT-01 board.
2. Remove the two screws (PS3×16) shown in Fig. 3-41, and remove the T-tension arm assembly. Install the new T-tension arm assembly, and insert the connector CN004 at its original position.

Tension Adjustment

3. Install the T-tension post (the part of the prepared adjustment tool in the position shown in the right of Fig. 3-41. Apply the weight marked T135 as shown in the figure.
4. Connect the digital voltmeter to TP13 on the RL-12 board. And turn on the power of VTR.
5. Confirm that the indication of the digital voltmeter is 0V ± 0.03V. If necessary, adjust RV13 on the RL-12 board.
6. Replace the weight by the one marked T240.
7. Confirm that the indication of the digital voltmeter is 1.4V ± 0.15V. If necessary, adjust RV2 on the TT-01 board.
8. Replace the weight by T135 weight and perform the confirmation in step 5 again.
   Repeat steps 5 to 8 until both the specifications are satisfied without any adjustment.
9. Remove the weitht and the T-tension post.

Tape Path Confirmation

10. Thread a tape, and confirm that the tape does not curl near the tension roller and near the timer roller in REC mode. If it should curl, adjust according to section 3-24-2. Carry out the same confirmation also for F.FWD, REV ×1 program JOG, and REW mode.

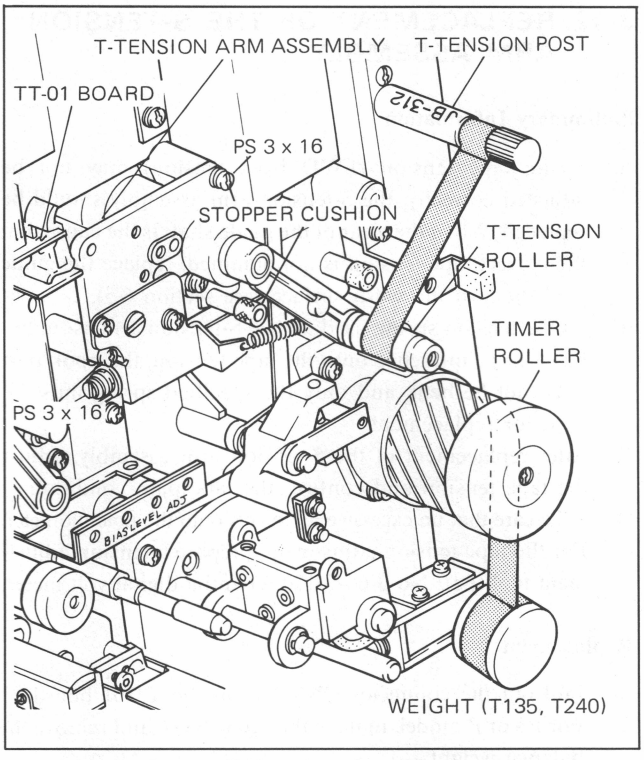


Fig. 3-41. T-Tension Arm Replacement

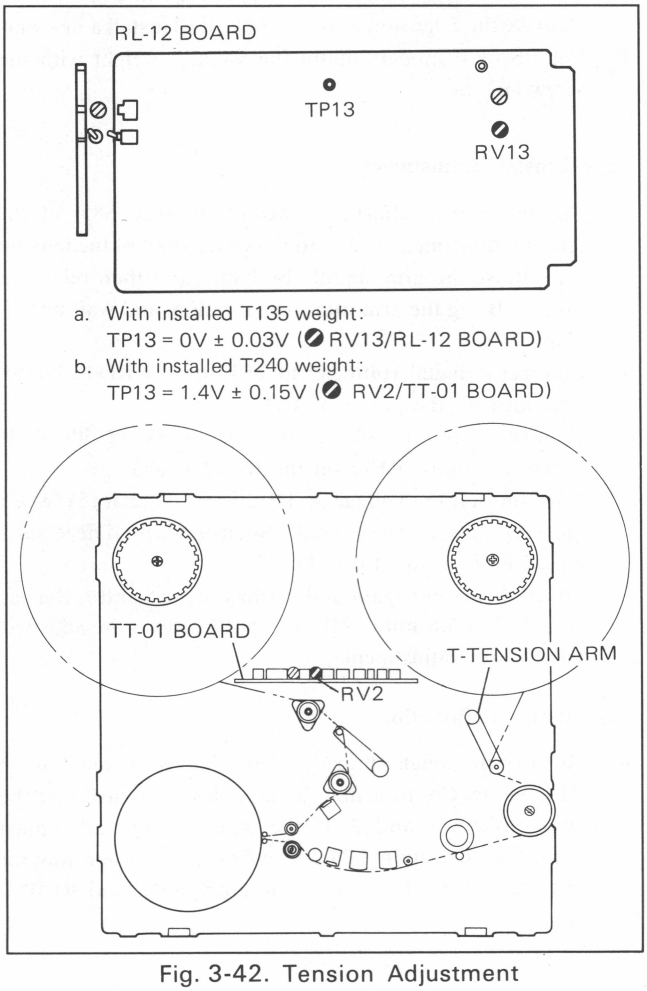


Fig. 3-42. Tension Adjustment

3-14. AIR DAMPER ADJUSTMENT

Preliminary Information

A. When the tape becomes abnormally tight or loose near the T-tension arm assembly, the damping speed of the air damper should be confirmed.
B. As the spring applied to the tension arm has a large influence onto the tape tension, the hook shape must not be changed, and the air damper rod must not be bent.
C. One of the drum start conditions is that the tape tension is above a certain value, so that drum start in STANDBY mode should be confirmed after air damper adjustment.
D. Take care that no excessive force acts on the potentiometer.

Removal

1. Pull out the connector CN004 from the TT-01 board.
2. Remove the two screws securing the T-tension arm assembly.
3. Remove one end of the tension spring installed between the T-tension arm and the spring holder.
4. Remove the nut at the tip of the connection rod, and remove the air pot holder of the tension arm from the connection rod.

Damping Speed Adjustment

5. Apply a 40 grams weight as shown in Fig. 3-44 to the tip of the connection rod, push the piston against the end of the cylinder, and release it quietly. Confirm that the time required for free dropping of the cylinder over the distance shown in the figure is 10 sec ± 1 sec. If necessary, adjust with the adjustment screw at the end of the cylinder.

Installation

6. Place the air pot holder of the tension arm onto the tip of the connection rod, and tighten the nut.
7. Apply the tension spring of the tension arm to the spring holder.

   Note: Do not bend or transform the hook part after application of the spring.
8. Install the tension arm at the specified position with two screws (PS3×16).

Drum Start Confirmation

9. Thread a tape, and loosen the tape slightly near the take-up and supply reel. Confirm that the drum starts to rotate when the unit is set in STANDBY mode.

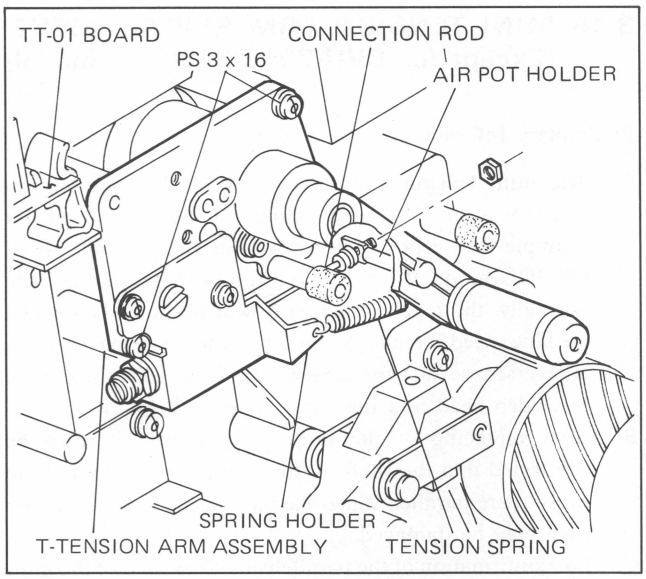


Fig. 3-43. T-Tension Arm Assembly

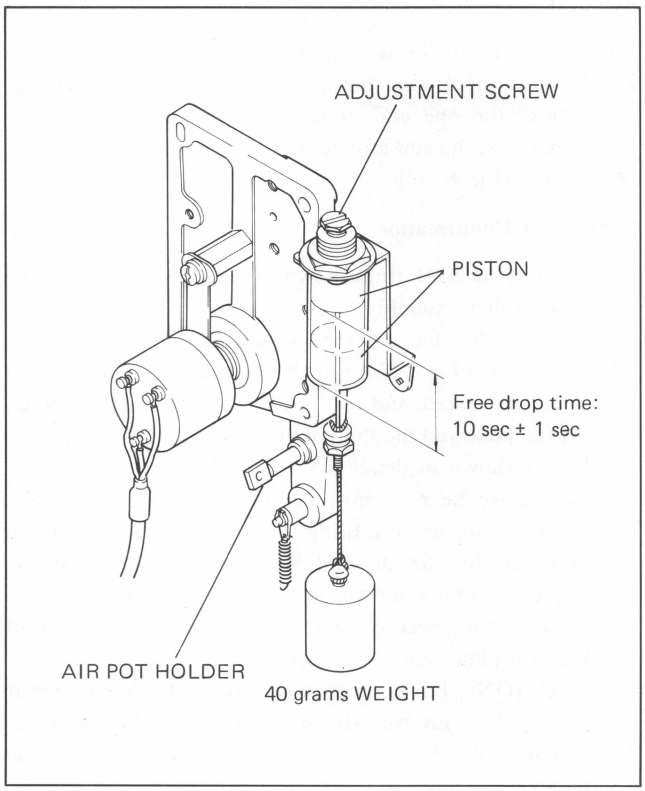


Fig. 3-44. Damping Speed Adjustment

3-15. MINI TENSION ARM REPLACEMENT (Except for BVH-2000/2180 00 model)

Preliminary Information

A. The mini tension arm serves to keep the tape tension constant even with rapid change of the tape speed, for example with a playback mode with variable tape speed like JOG mode. If the mini tension arm does not operate normally, the tape momentarily will become slack when the tape speed is reduced rapidly or when the tape direction is reversed, so that the tape will be incorrect contact with the video head and the video signal will be lost.

B. After replacing of the mini tension arm, it must be confirmed that the shaft of the mini tension arm and the capstan are parallel. When the parallelism is bad, the tape edge may be damaged.

C. For confirmation of the parallelism of the shaft of the mini tension arm, prepare a flat plate (part No. J-6040-160-A).

Removal

1. Remove the two screws fixing the TD-05 board.
2. Remove the E ring holding the mini tension arm and remove the one end of the spring shown in Fig. 3-45. Replace for the new mini tension arm, apply the spring and reinstall the E ring.

Parallelism Confirmation

3. Remove the two E rings shown in Fig. 3-46, and remove the pinch roller assembly.
4. Place the flat plate into the position shown by the hatching in detail a of Fig. 3-46, bring the flat plate into close contact with the capstan, and confirm that the clearance between the flat plate and the shaft of the tension arm is 0.05 mm or less as shown in detail b.
   Next, move the mini tension arm in the direction shown by the arrow in detail a, bring the flat plate to the position indicated by the dot-and-dash line, and confirm the clearance in the same way as before. When the clearance is outside of the specified value, adjust by bending the part of the arm plate hatched in detail a.
   CAUTION: For bending of the arm plate, take care that no excessive force acts onto the arm post.
5. Install the pinch roller assembly in the reverse order of the removal.
6. Install the TD-05 board with the two screws (PS2.6×6).
7. Thread a tape, set the machine in REC mode, and confirm that there is a clearance of 0.3 to 0.8 mm between the mini tension arm and the tape. If necessary, adjust by bending the claw in detail a of Fig. 3-46.

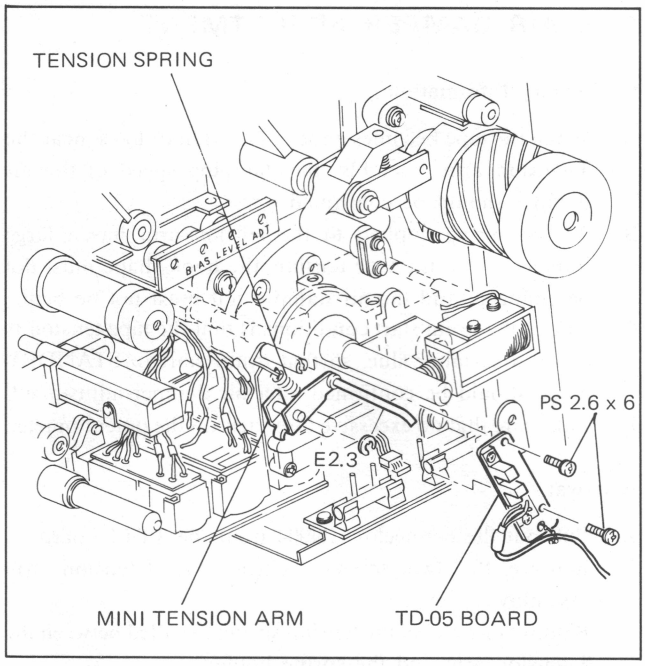


Fig. 3-45. Mini Tension Arm Replacement

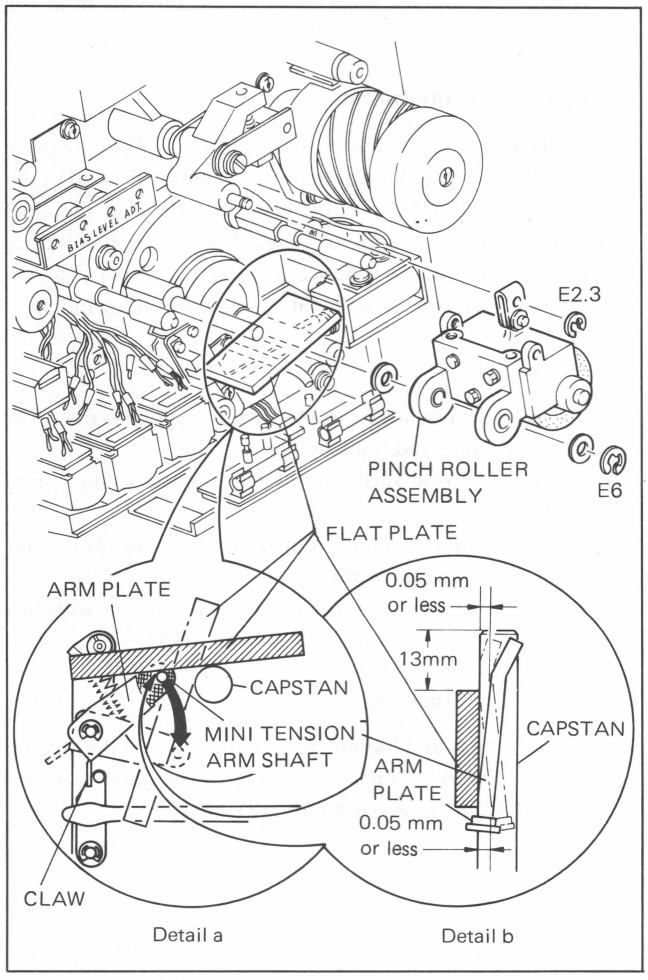


Fig. 3-46. Parallelism Confirmation for the Mini Tension Arm Shaft

3-16. MINI TENSION ARM SOLENOID REPLACEMENT (Except for BVH-2000/2180 00 model)

Preliminary Information

After the replacement, the solenoid installation position must be adjusted. When the solenoid is not installed in the correct position, the mini tension arm will not operate correctly, and the contact between tape and video head may become incorrect when the tape speed is changed rapidly in JOG mode, so that the video signal may be lost.

Removal

1. Pull out the connector CN007 from the TT-01 board. If the harness is held by a clamp, remove the clamp.
2. Remove the two screws securing the TD-05 board.
3. Remove the two screws (PSW3×8) and the post shown in Fig. 3-47, and remove the mini tension arm assembly.
4. Remove the two screws securing the solenoid, and remove the solenoid and the compression spring (This spring will be used again later.)

Installation

5. Pass the previously removed compression spring through the plunger of the new solenoid, and fix the solenoid lightly with the two screws (PS2.6×6) to the mini tension arm assembly so that it can be moved by hand.
6. Adjust the position of solenoid so that the stopper and the rod becomes come in contact each other as shown in the detail of Fig. 3-47 when the solenoid plunger is attracted by hand, and then fix the solenoid by tightening the two screws.
7. Fix the mini tension arm assembly with the two screws (PSW3×8) and the post to the flange of the capstan motor.
8. Fix the TD-05 board with the two screws (PS2.6×6).
9. Plug the connector CN007 from the solenoid at the specified position on the TT-01 board, and if the harness had been fixed by a clamp, also apply the clamp again.
10. Thread a tape, set the machine in REC mode and confirm that the clearance between the mini tension arm shaft and the tape is 0.3 to 0.8 mm. If neccessary, adjust by bending the claw shown in Fig. 3-47.

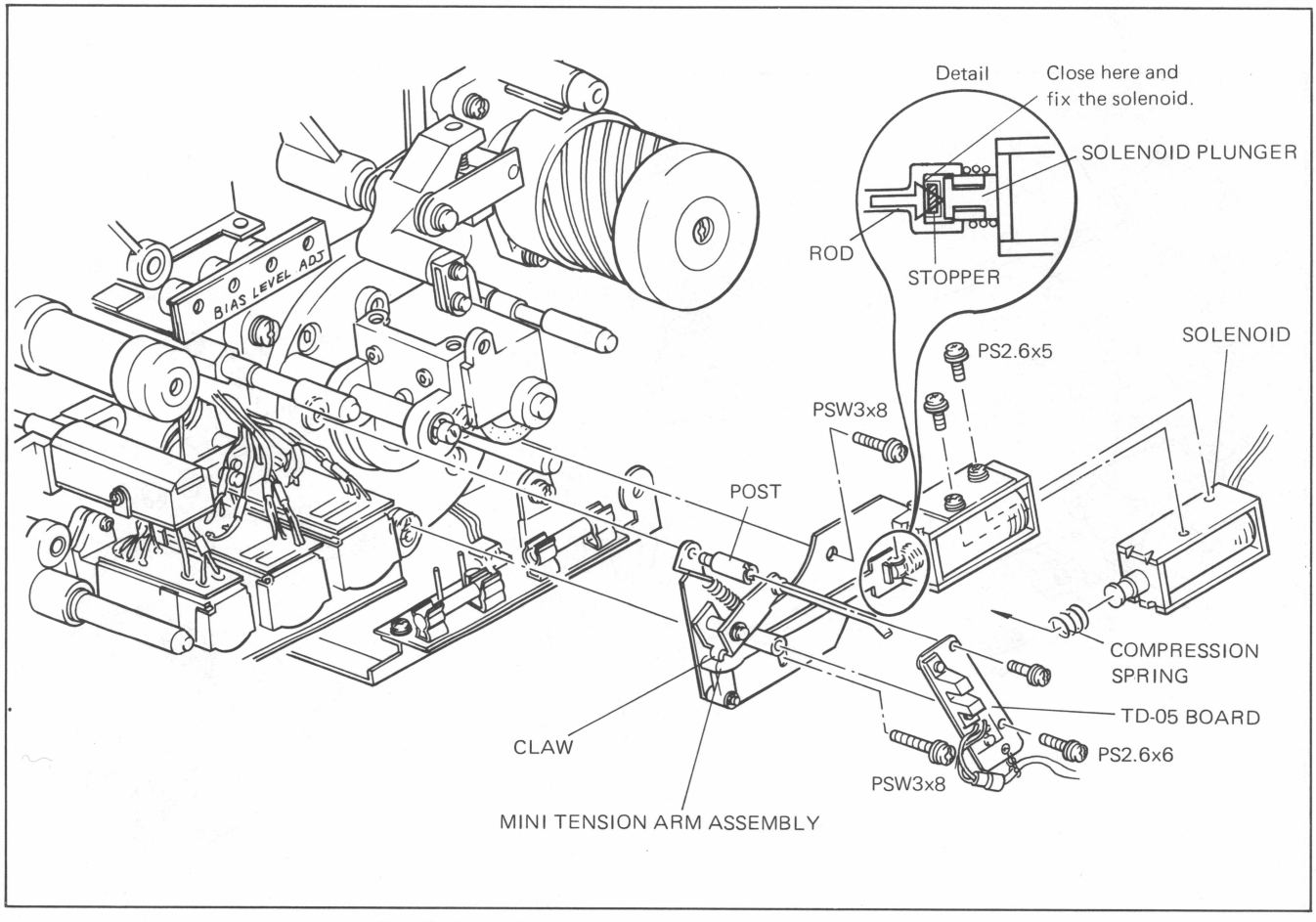
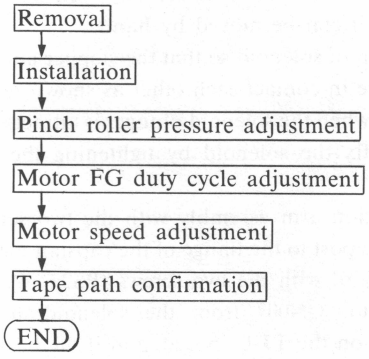


Fig. 3-47. Mini Tension Arm Solenoid Replacement

3-17. CAPSTAN MOTOR REPLACEMENT

Preliminary Information

A. The capstan motor is replaced according to the following flowchart.



B. For pinch roller pressure adjustment, prepare a tension scale with a full scale of 5 kg (part No. J-6041-640-A) and a 20 cm long string.

C. As the indication value of a tension scale differs somewhat according to the pulling direction, adjust the zero point of the tension scale in advance in the use direction.

Removal

1. Go to the rear of the machine, open the power supply unit, and pull out the connector CN106 from the capstan motor. Further, pull out the connectors CN102 and CN103 from the CA-09 board.
2. Return to the front of the machine, and pull out the connector CN007 from the TT-01 board.
3. Remove the two screws ① (PS2.6×6) securing the TD-05 board.
4. Remove the two screws ② (PSW3×8) and the post ③ shown in Fig. 3-48, and remove the mini tension arm assembly.
5. Remove the two E rings ④ and ⑤, and remove the pinch roller assembly and the poly-washer.
6. Remove the pinch roller post ⑥ and the cover post ⑦.
7. Rmove the 4 screws ⑧ (C4×20), and remove the capstan motor.

Installation

8. Fix the new capstan motor with the four screws ⑧ (C4×20) via washers and spring washers.
9. Reinstall the removed parts in reverse order from step 6 to step 1.

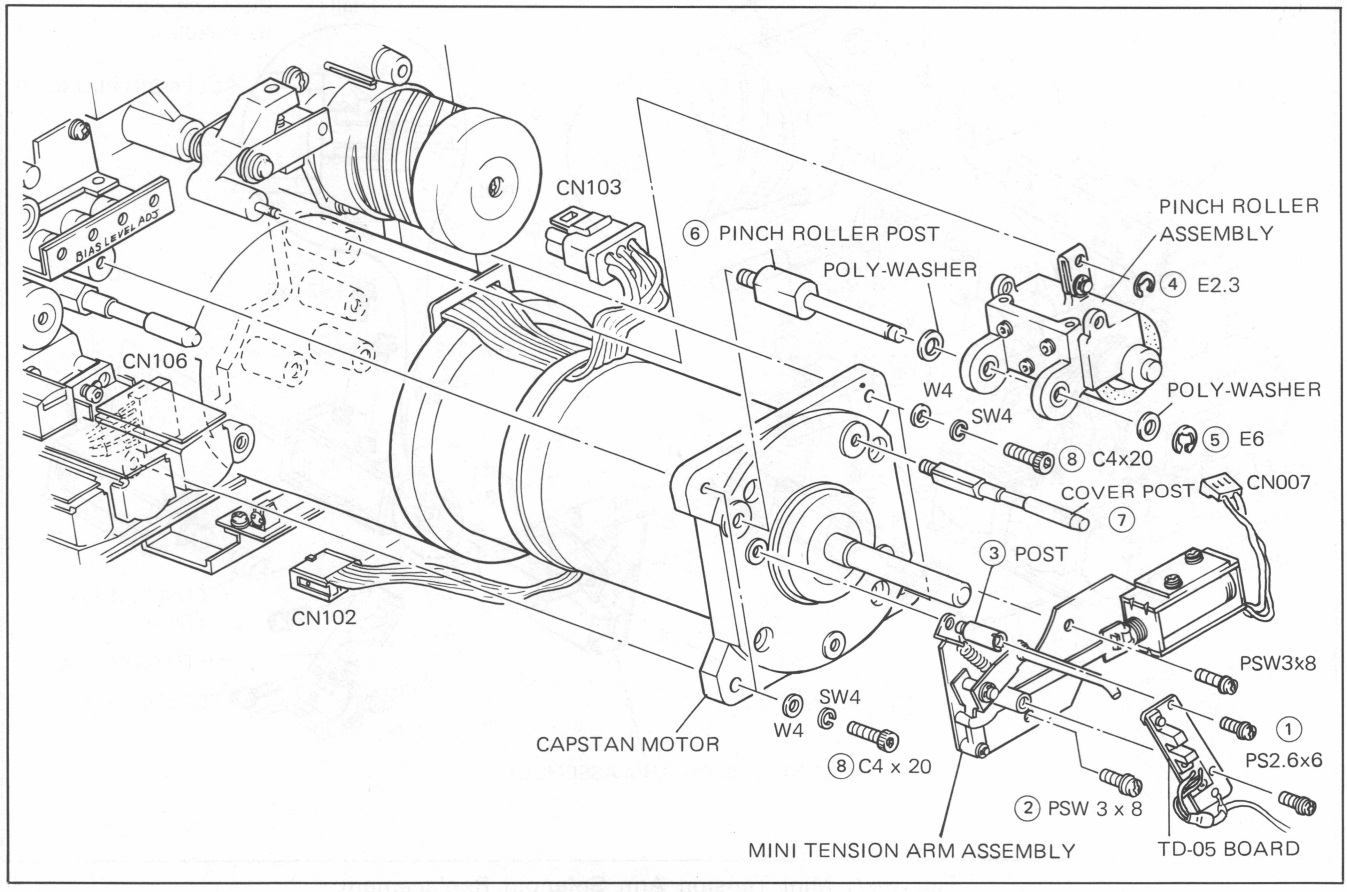


Fig. 3-48. Capstan Motor Replacement

Pinch Roller Pressure Adjustment

10. Set S4 (TEST 1) and S5 (TEST 2) switches to "5" and "1" respectively, and depress S7 (ENTRY) switch for at least 0.5 sec.
11. Apply the 5 kg tension scale as shown in Fig. 3-49 to the pinch roller arm. Pull the tension scale in the direction connecting the capstan and the pinch roller as shown by the arrow in detail a, separate the pinch roller once from the capstan, and wait until the rotation of the pinch roller stops. Return the tension scale in direction of the capstan, and confirm that the indication value of the tension scale is 3.7 to 4.0 kg when the pinch roller starts to rotate again. If necessary, adjust according to the following step.
12. Turn the adjustment screw shown in detail b according to the condition.
13. When the pinch roller pressing against the capstan, confirm that the clearance between the pinch lever and the stopper is 0.3 ± 0.1 mm as shown in detail b. If necessary, adjust the stopper position. Apply the locking compound to the threaded part of the adjustment screw.
14. Press S3 (RESET) on the SY-80 board.

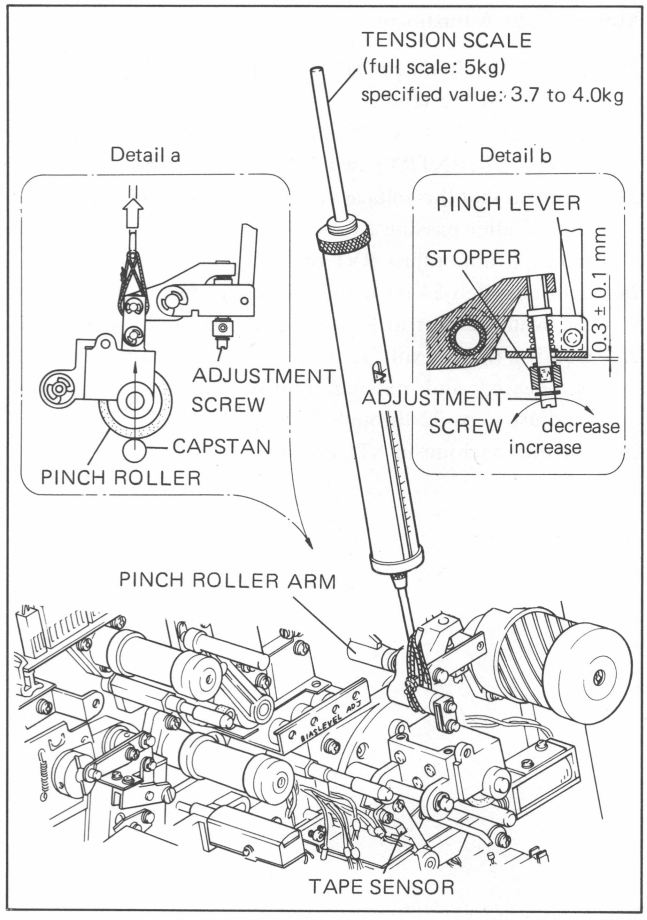


Fig. 3-49. Pinch Roller Pressure Adjustment

Motor FG Duty Cycle Adjustment

15. Insert a piece of opaque paper or a piece of video tape into the slit of the tape sensor, and fix it.
16. Set S4 (TEST 1) on the CD-17 board to "1", and press S7 (ENTRY) for at least 0.5 sec.
17. Set the machine in the following mode.
    for NTSC, PM: 10/30 FWD PROGRAM JOG mode
    for PS, P: 8/25 FWD PROGRAM JOG mode
18. Confirm that the duty cycle of the waveform at TP6 of the CD-17 board is 50% as shown in Fig. 3-50. If necessary, adjust RV2.
19. In the same way, confirm that the duty cycle of the waveform at TP7 of the CD-17 board also is 50%. If necessary, adjust RV3.
20. Press the STOP button and then press S3 (RESET) on the SY-80 board. Remove the shade from the tape sensor.

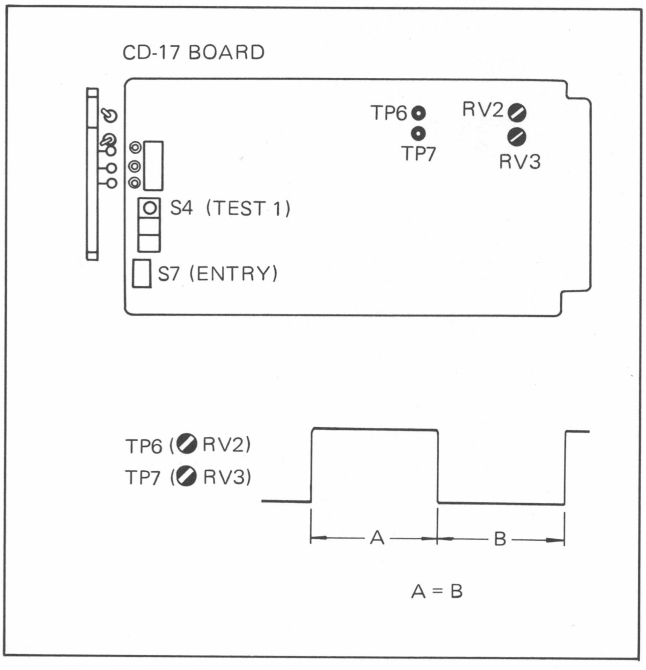


Fig. 3-50. Motor FG Duty Cycle Adjustment

Motor Speed Adjustment

21. Thread an alignment tape, and play back the "WHITE" segment of the tape.
22. Set S4 (TEST 1) switch on the CD-17 board to "B", and depress S7 (ENTRY) switch for at least 0.5 sec.
23. Confirm that the voltage at TP1 on the CD-17 board is 0V ± 0.1V after passing five seconds or more in the test "B" mode. If not, adjust RV1 on the CD-17 board.
24. Set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec. Test mode is released.
25. Confirm that the voltage at TP1 is 0V ± 0.2V after test mode is released and passing approx. five seconds. If not, readjust steps 22 through 25.
26. Set the machine in STOP mode.

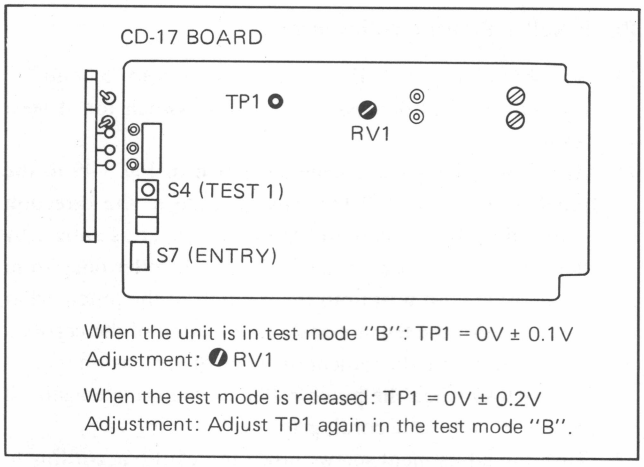


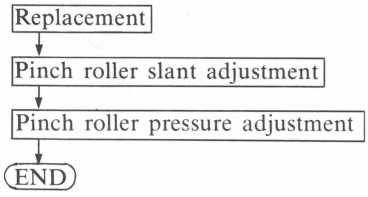
Fig. 3-51. Motor Speed Adjustment

3-18. PINCH ROLLER REPLACEMENT

Preliminary Information

A. When the pinch roller has been replaced, the slant of the pinch roller against the capstan must be adjusted. When this adjustment is not sufficient, the pinch roller may be deformed, thus causing wow, and the tape may be damaged.

B. The pinch roller is replaced according to the following procedures.



C. Prepare the following instruments for adjustment and confirmation.
   (1) Thickness gauge: J-6041-670-A
   (2) Tension scale (5 kg): J-6041-640-A

Replacement

1. Remove the two E rings shown in Fig. 3-52, and remove the pinch roller assembly.
2. Remove the two set screws securing the pinch roller shaft from the pinch roller assembly, and remove the pinch roller.
3. Replace the pinch roller for a new one, and reinstall the parts in the reverse order of the above steps 1 and 2.

Pinch Roller Slant Adjustment

4. Lightly push the pinch roller towards the capstan as shown in Fig. 3-53, and confirm that there is close contact or that the clearance at the bottom is 0.03 mm or less when the pinch roller just comes into contact with the capstan. If the clearance is larger, or if there is a clearance at the top, loosen the locking screw, and adjust the slant of the pinch roller.

Pinch Roller Pressure Adjustment

5. Set S4 (TEST 1) and S5 (TEST 2) switches on the CD-17 board to "5" and "1" respectively, and depress S7 (ENTRY) switch for at least 0.5 sec.
6. Use the string to attach the 5 kg tension scale to the pinch roller arm, pull in the direction connecting the capstan and the pinch roller, and separate the pinch roller from the capstan. Wait until the rotation of the pinch roller stops, return the pinch roller slowly towards the capstan, and confirm an indication value of 3.7 to 4.0 kg for the tension scale when the pinch roller again starts to rotate. If not, adjust with the pressure adjustment screw.

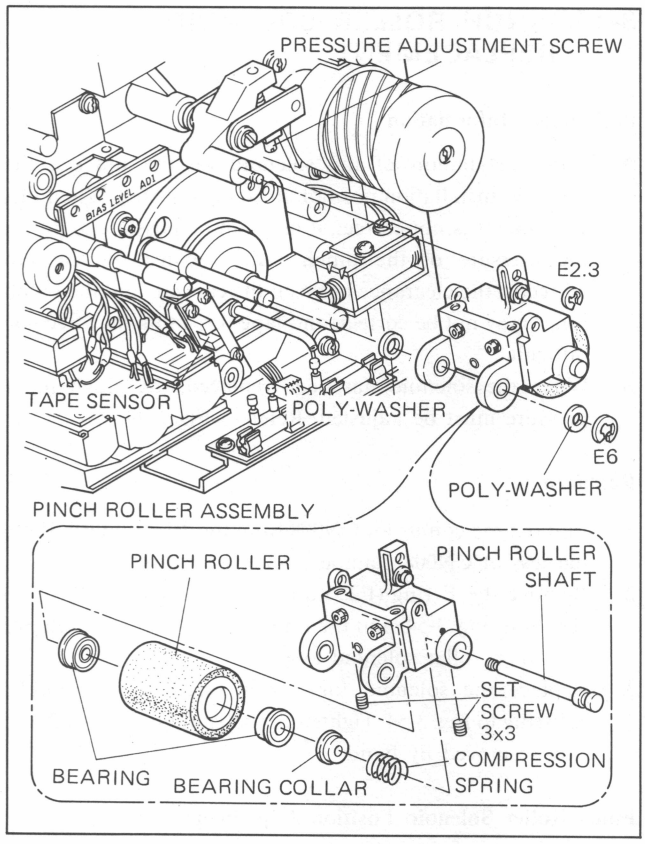


Fig. 3-52. Pinch Roller Replacement

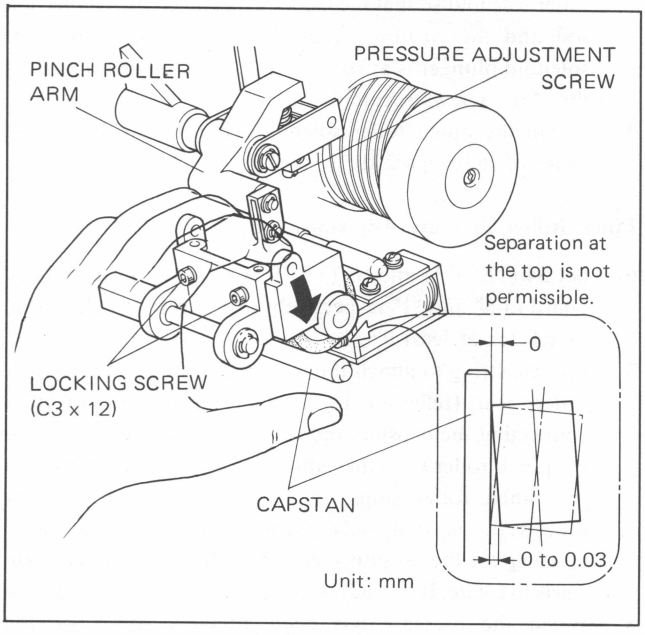


Fig. 3-53. Pinch Roller Slant Adjustment

7. When the pressure has been adjusted, apply adhesive (for example locking compound) to the threaded part of the adjustment screw. Next, when the pinch roller pressing against the capstan, confirm that the clearance between the pinch lever and the stopper is 0.3 ± 0.1 mm.
8. Press S3 (RESET) on the SY-80 board.

3-19. PINCH ROLLER SOLENOID REPLACEMENT

Preliminary Information

A. With installation of the solenoid on the bracket, the solenoid installation position must be adjusted. When this adjustment is not correct, it may not be possible to adjust the pressure of the pinch roller against the capstan correctly, the clearance between the capstan and the pinch roller may not be correct, and tape threading may become difficult.

B. When the solenoid has been replaced, the pinch roller pressure must be adjusted. Refer to Fig. 3-49.

Replacement

1. Pull out the connector CN008 from the TT-01 board. If the harness of CN008 clamped, remove it also.
2. Remove the E ring (E2.3) and the three screws (PS4×10) shown in Fig. 3-54, and then turn the post screw to remove the pinch roller solenoid assembly.
3. Replace the solenoid for a new one and reassemble, referring to Fig. 3-54. Tighten the solenoid lightly, so that it can be moved by hand.

Pinch Roller Solenoid Position Adjustment

4. As shown in Fig. 3-55, adjust the position of the pinch roller solenoid so that the clearance between the connection rod and the cushion becomes 7.0 ± 0.2 mm when the solenoid plunger is attracted. After the adjustment, tighten the three screws securely.
5. Install the pinch roller solenoid assembly in the reverse order of the steps 2 to 1.

Pinch Roller Pressure Adjustment

6. Set S4 (TEST 1) and S5 (TEST 2) switches on the CD-17 board to"5" and "1" respectively, and depress S7 (ENTRY) switch for at least 0.5 sec.
7. Use the string to attach the 5 kg tension scale to the pinch roller arm (refer to Fig. 3-49), pull in the direction connecting the capstan and the pinch roller, and separate the pinch roller from the capstan. Wait until the rotation of the pinch roller stops, return the pinch roller slowly towards the capstan, and confirm an indication value of 3.7 to 4.0 kg for the tension scale when the pinch roller again starts to rotate. If not, adjust the pressure adjustment screw.
8. When the pressure has been adjusted, apply locking compound to the threaded part of the adjustment screw. Next, when the pinch roller pressing against the capstan, confirm that the clearance between the pinch lever and the stopper is 0.3 ± 0.1 mm as shown in Fig. 3-49.
9. Press S3 (RESET) on the SY-80 board.

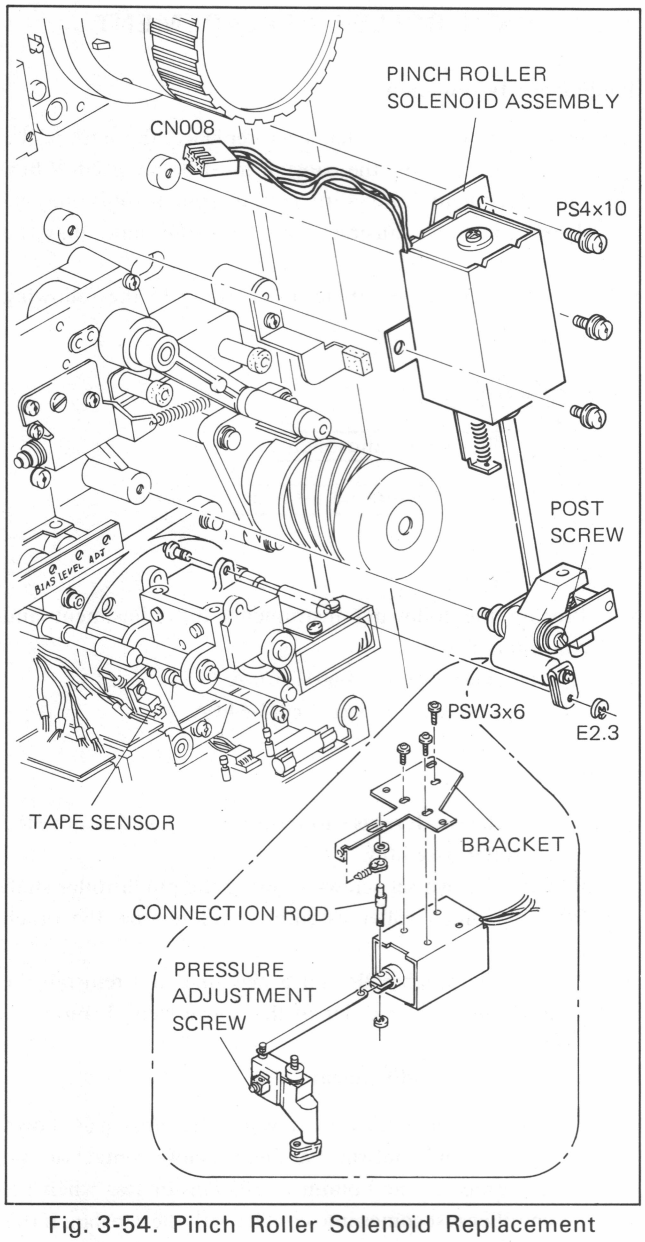


Fig. 3-54. Pinch Roller Solenoid Replacement

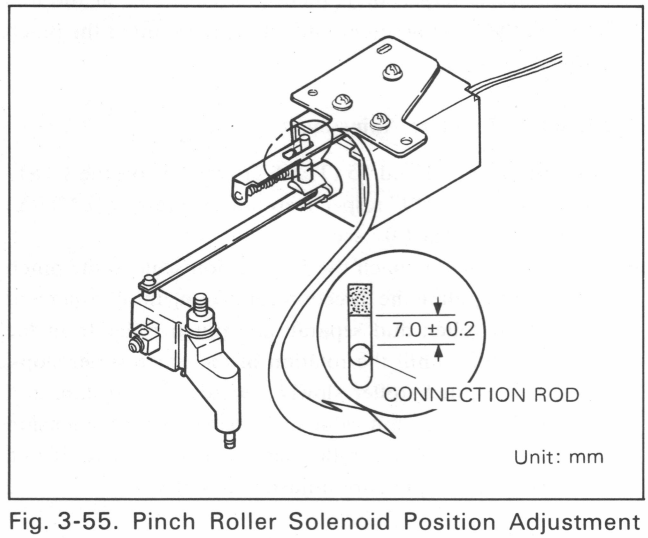


Fig. 3-55. Pinch Roller Solenoid Position Adjustment

3-20. AUDIO/CTL R/P HEAD REPLACEMENT

When the audio/CTL R/P head (in the follwoing abbreviated as head) is replaced, it is possible that head azimuth, height, position, etc. differ from those before the replacement, so that adjustment according to the flowchart of section 3-24-1 must be carried out after the replacement.

Removal

1. Remove the R/P shielding case cover.
2. Remove the leads from the head. .
   Note: Take care not to touch the drum cover with the soldering iron.
3. Remove the two screws (C3×16 and C3×10) shown in Fig. 3-56-A, and remove the head assembly.
   Note: Do not turn any other screws than these two screws.
4. Remove the HD-07 (except for PS 04 model) or HD-08 (for PS 04 model) boards from the head assembly.
5. Remove the two screws securing the head.
   Note: The head can be replaced even if the shielding case is joined together.

Installation

6. Pushing the new head towards the shielding case, fix it with two screws (PSW2.6×6).
   Note: When the shielding case had been removed, fix shielding case to the head base lightly and place the head assembly as shown in Fig. 3-56-C onto a flat table, insert a thickness gauge with a thickness of 0.4 mm between the head and the flat table, depress the shielding case lightly, and tighten the previously lightly tightened screws securely.
7. Solder the HD-07 or HD-08 boards to the head assembly.

Head Assembly Installation

8. Install the head assembly so that the hole shown in Fig. 3-56-B is placed onto the pin on the head table.
   Note 1: Tighten the two screws so that the head assembly will be parallel to the neighboring audio/CTL erase head.
   Note 2: Tighten the two screws finally with a torque of 6 to 8 kg-cm. Please note that excessive tightening of the screws may cause change of Zenith.
9. Solder the leads to the head referring to Fig. 3-56-D.
10. Reinstall the R/P shielding case cover.
11. Adjust the tape path system and the audio signal system according to the flowchart of section 3-24-1.

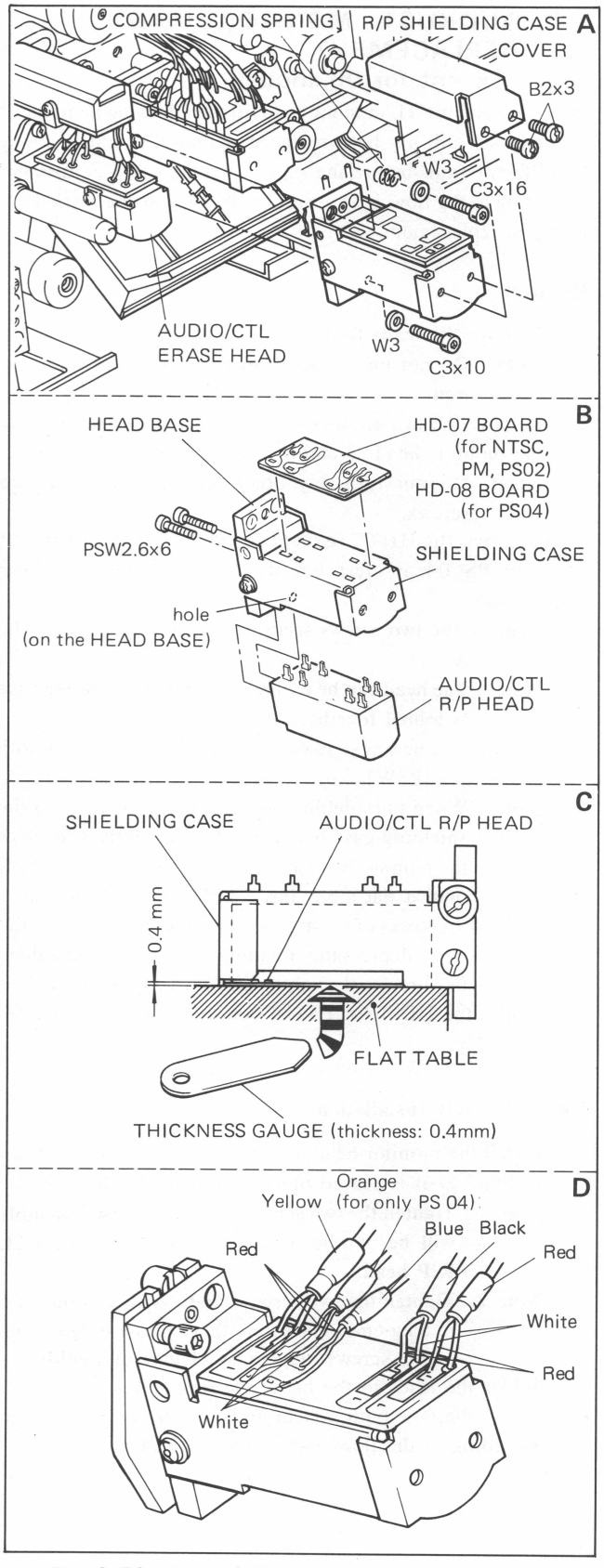


Fig. 3-56. Audio/CTL R/P Head Replacement

3-21. AUDIO/CTL MONITOR HEAD REPLACEMENT (Except for 00 model)

When the audio/CTL monitor head (in the following abbriviated to monitor head) has been replaced, azimuth, height, etc. may be different from before the replacement, so that adjustment according to the flowchart of section 3-24-1 must be carried out after the replacement.

Removal

1. Remove the leads from the monitor head.
   Note: Do not touch the drum cover with the soldering iron.
2. Remove the two screws shown in Fig. 3-57-A, and remove the monitor head assembly.
   Note: Do not turn any other screws than these two screws.
3. Remove the HD-07 (except for PS 04 model) or HD-08 (for PS 04 model) boards from the monitor head assembly.
4. Remove the two screws securing the monitor head to the head base.
   Note: The head can be replaced even if the shielding case is joined together.
5. Pushing the new head towards the shielding case, fix it with two screws (PSW2.6×6).
   Note: When the shielding case has been removed, fix the shielding case to the head base lightly and place the monitor head assembly as shown in Fig. 3-57-C onto a flat table, insert a thickness gauge with a thickness of 0.4 mm between the head and the flat table, depress the shielding case lightly, and tighten the previously lightly tightened screws securely.
6. Solder the HD-07 or HD-08 boards to the monitor head assembly.

Head Assembly Installation

7. Install the monitor head assembly so that the hole shown in Fig. 3-57-B is placed onto the pin on the head table.
   Note 1: Tighten the two screws so that the head assembly will be parallel to the neighboring audio/CTL R/P head.
   Note 2: Tighten the two screws finally with a torque of 6 to 8 kg-cm. Please note that excessive tightening of the screws may cause change of Zenith.
8. Solder the leads to the head referring to Fig. 3-57-D.
9. Adjust the tape path system and the audio signal system according to the flowchart of section 3-24-1.

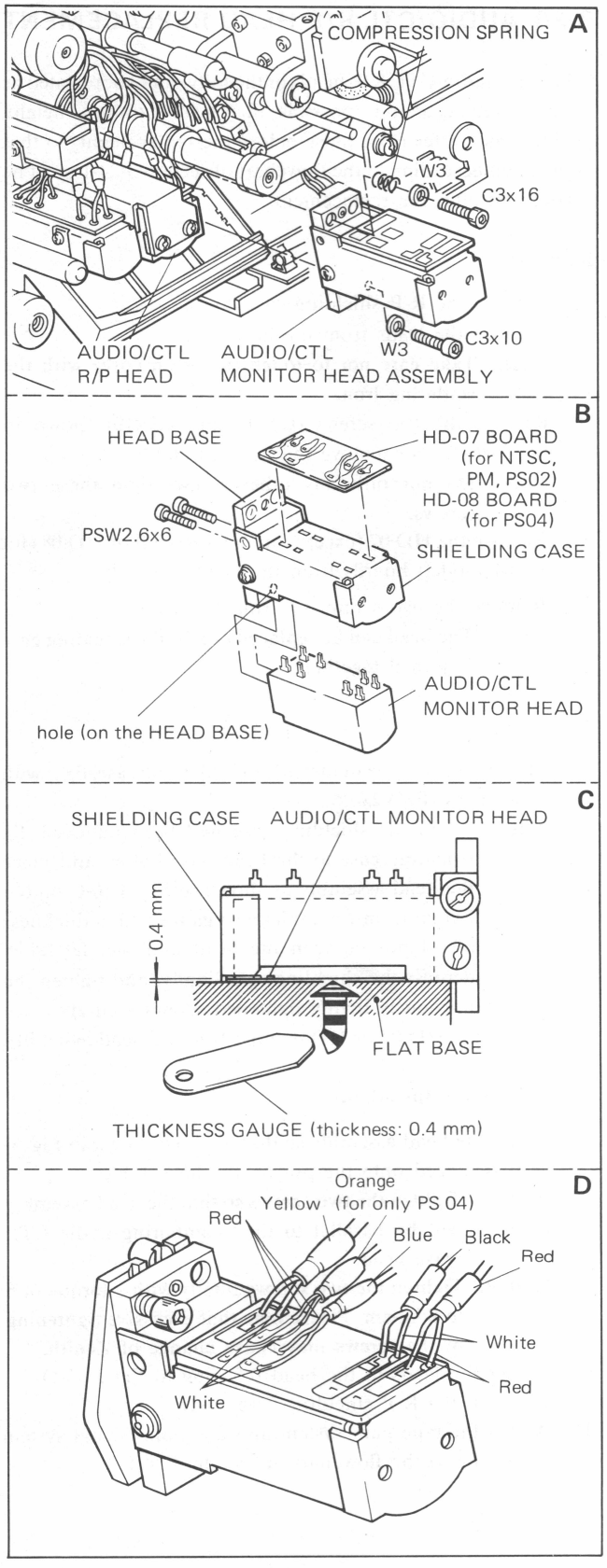


Fig. 3-57. Audio/CTL Monitor Head Replacement

3-22. AUDIO/CTL ERASE HEAD REPLACEMENT

After replacement of the audio/CTL erase head (in the following abbriviated to erase head), confirm the head height according to section 3-24-11, and then adjust the required items for the audio signal system according to section 12.

Removal

1. Remove the leads from the erase head.
2. Remove the two screws shown in Fig. 3-58-A, and remove the erase head.
   Note: Do not turn any other screws than these two screws.
3. Remove the CEH-2 board from the erase head.
4. Remove the two screws securing the shielding case to the erase head.
5. Remove the two screws securing the erase head to the head base.

Installation

6. Fix the new erase head with the two screws (PS2.6×6) lightly to the head base, so that the head still can be moved lightly.
7. Place the erase head as shown in Fig. 3-58-C onto a flat table, depress it lightly from above, and tighten the two screws securely.
8. Place the shielding case over the erase head, and fix it with the two screws (B2×3).
9. Attach the CEH-2 board by soldering so that it is in close contact with the rear of the shielding case.

Head Assembly Installation

10. Fix the erase head assembly with the two screws (PS3×8).
11. Solder the leads to the head referring to Fig. 3-58-D.
12. Confirm the height of the erase head according to section 3-24-11.
13. Adjust the erase current and the erase frequency according to section 12.

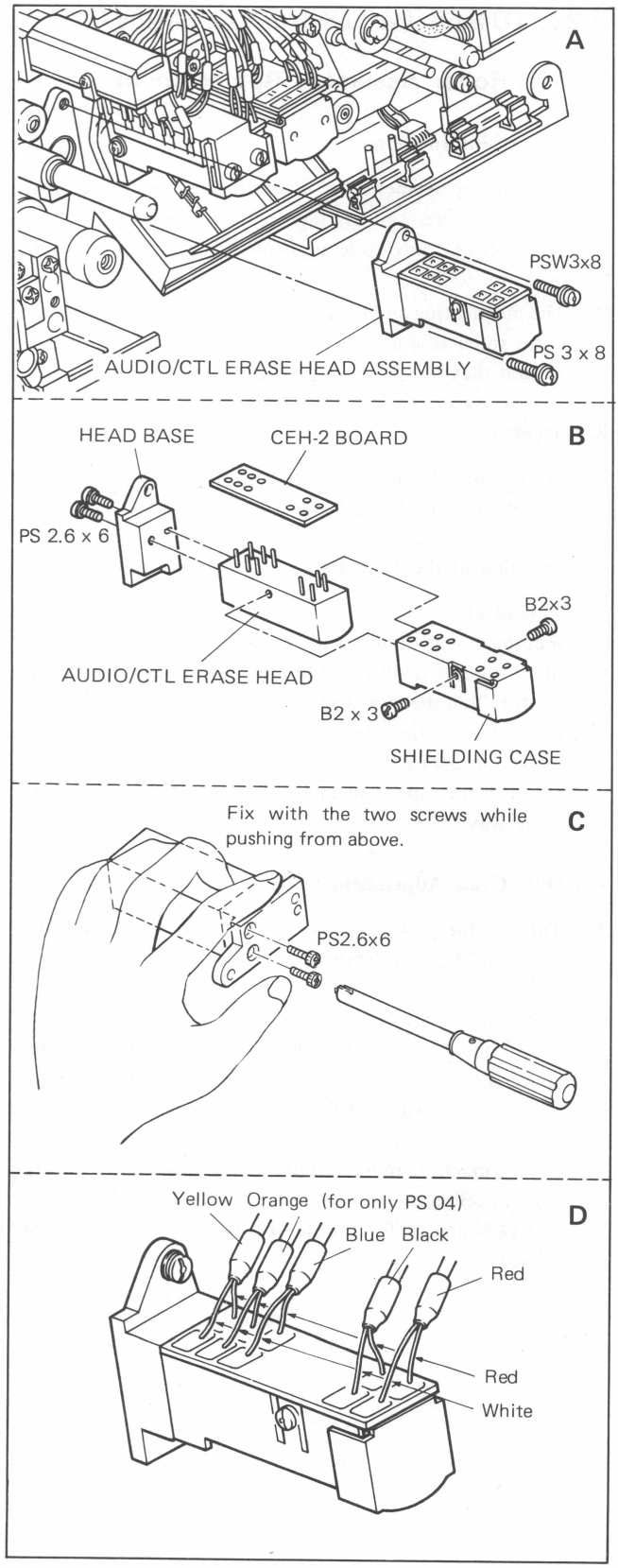


Fig. 3-58. Audio/CTL Erase Head

3-23. OTHER PARTS REPLACEMENT

3-23-1. Roller Assembly Replacement

Preliminary Information

A. Bearing replacement also is carried out in the sequence described here, and the tape path is confirmed.
However FG duty cycle adjustment is not required in this case.

B. The magnet ring and the timer roller, which are components of the roller assembly, are glued to each other by adhesive, so that they should be replaced as an assembly.

Replacement

1. Disassemble the timer roller as shown in Fig. 3-59, replace the required parts, and reassemble.

Confirmation of the Tape Path

2. Thread a tape, and set the machine in REC mode. Confirm that the tape is in light contact with the upper flange of the timer roller assembly and that the tape does not curl. Also confirm that the tape does not curl near the T-tension arm. If necessary, adjust the height of the upper flange, referring to section 3-24-2.
Confirm the tape path in F.FWD and REW mode in the same way.

FG Duty Cycle Adjustment

3. Turn on the power, set S4 (TEST 1) switch on the CD-17 board to "1", and depress S7 (ENTRY) switch for at least 0.5 sec.
4. Confirm that the duty cycle of the waveform of TP6 on the RL-12 board is 50% when the machine is in FWD 3 times speed mode. If necessary, adjust RV3 on RL-12 board.
5. In the same way, confirm a duty cycle of 50% for the waveform of TP15.
6. Set the machine in STANDBY mode and remove the tape.
7. For cancellation of the test mode, set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec.

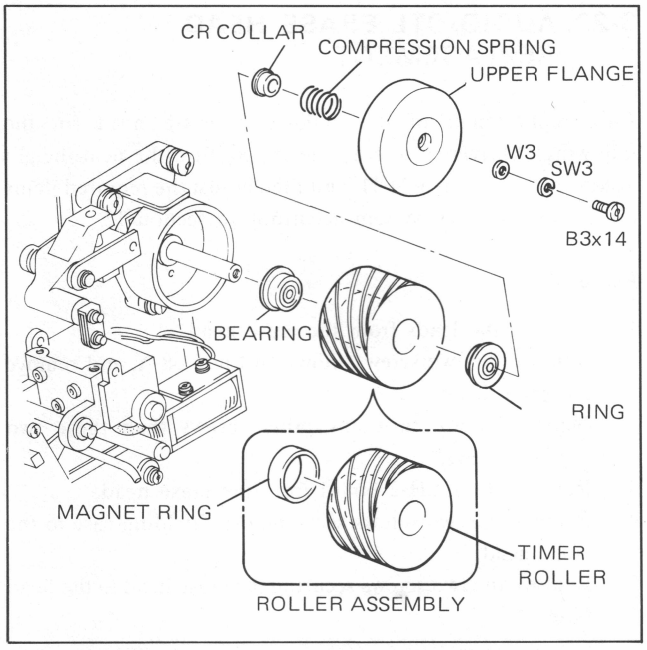


Fig. 3-59. Roller Assembly Replacement

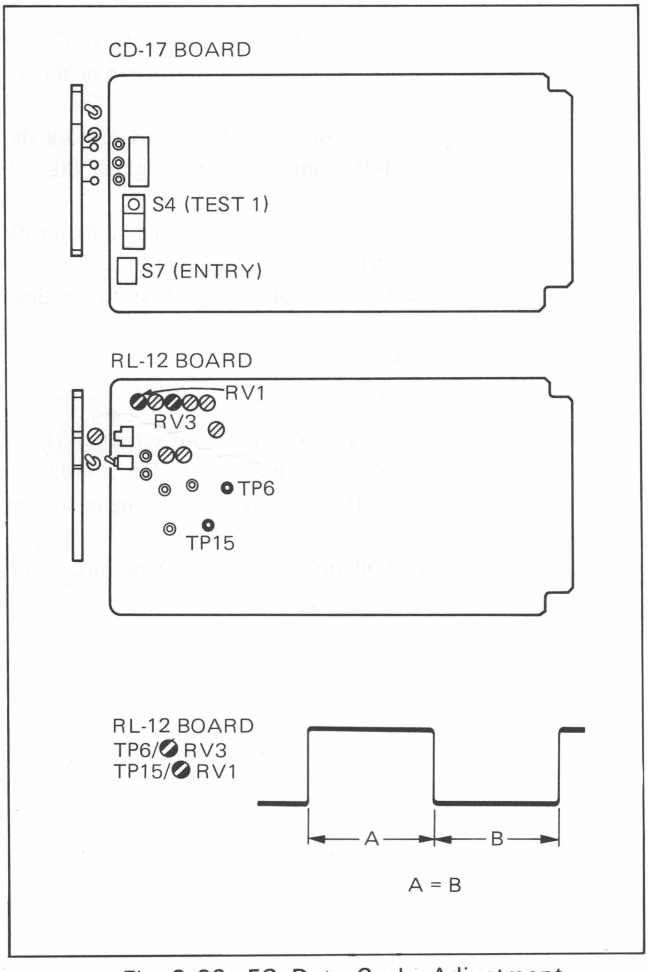


Fig. 3-60. FG Duty Cycle Adjustment

3-23-2. Reed Switch Replacement (Component of Movable Guide Assembly)

Preliminary Information

A. The reed switch on the TH-03 board is used to detect the stop position of the entrance and exit slant guides.

B If the reed switch is not mounted in the correct position, the slant guides may not perform an open and close operation correctly.

C. The relief plate mounted on the straight link protects the fingers from injury when threading a tape.
Once this mechnism operates by pinching the fingers, the slant guides will not be set in the correct position from the next threading.
In this case, fix the relief plate so that the both sides of the relief plate and the straight link are on the same plane.

Replacement

1. Remove the E ring (E3) securing the straight link.
2. Loosen the screw ⓒ securing the relief plate and remove the straight link.
3. Loosen the setscrew, remove the rotaty link.
4. Remove the used reed switch.
5. Cut off the leads of a new reed switch in the specified length shown in Fig. 3-61 detail a.
6. Put the part marked ● of the reed switch in the direction shown in detail a and solder the leads.
7. Put the rotary link on the shaft of the motor and tighten the setscrews.
8. Secure the straight link with the E ring (E3).
Move the relief plate in the direction shown in detail b and put the relief plate so that the both sides of the relief plate and the straight link are on the same plane and tighten screw ⓒ .
Note: The screw ⓒ must be tightened with the torque of approx. 10kg-cm.

Confirmation

9. Thread a tape and set the machine in the STANDBY mode and make sure that the slant guides close at the proper position.
10. When the tape has been pulled out from the end-of-tape sensor, make sure that the slant guides open and then make sure that the guides are closed when the tape is threaded into the end-of-tape sensor. Perform this procedure three times.

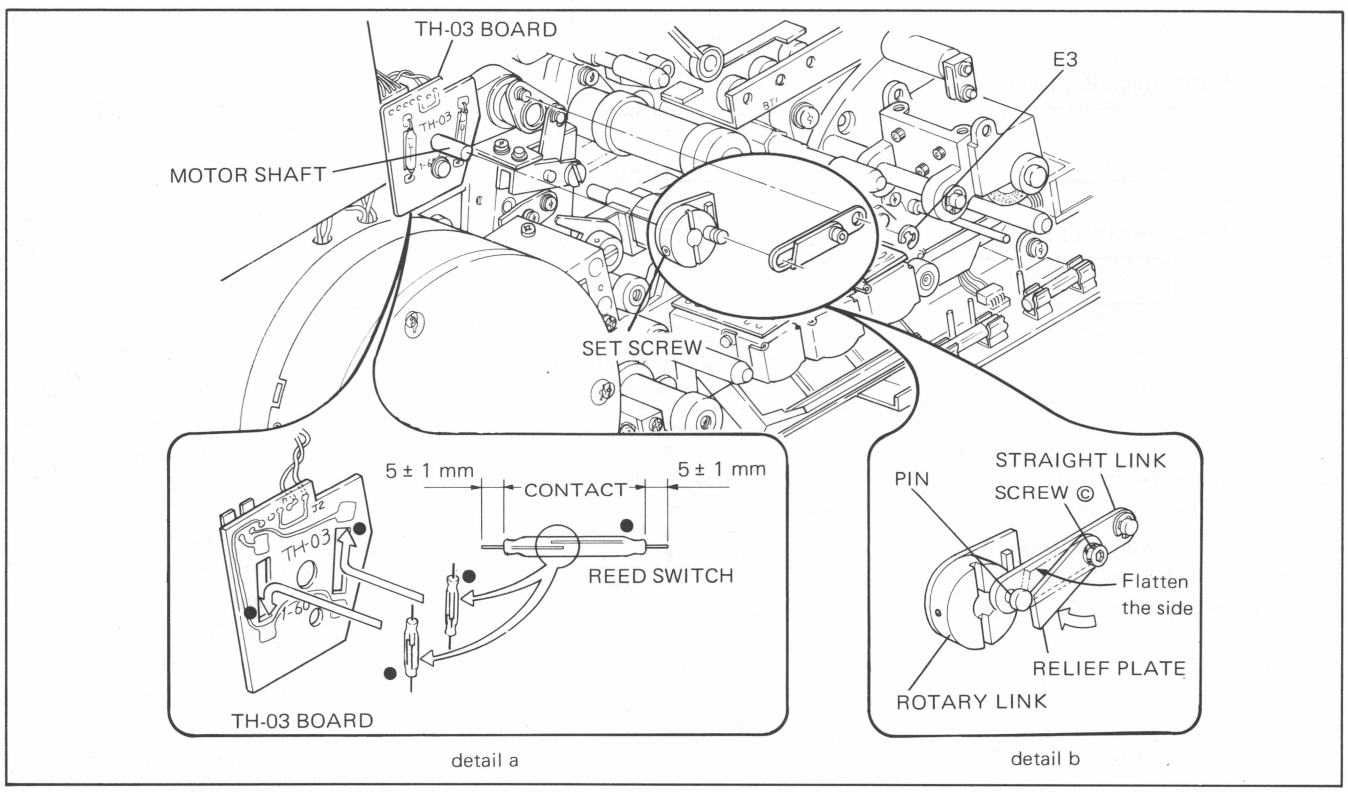


Fig. 3-61. Replacement of Reed Switch

3-24. TAPE PATH ADJUSTMENT AFTER REPLACING THE PARTS

3-24-1. Adjustment Flowchart

When the S-reel table, guide roller 1, guide roller 2, fixed guide 1, timer roller, T-tension arm or T-reel table is replaced, however the height adjustment is not required, the tracking check and the subsequent adjustments of the flowchart may be skipped.

Upper Drum Assy Replacement

When the upper drum assembly is replaced, however the tracking and CTL head position adjustments are not required, the following may be skipped.

3-24-9. Audio/CTL R/P Head Adjustment

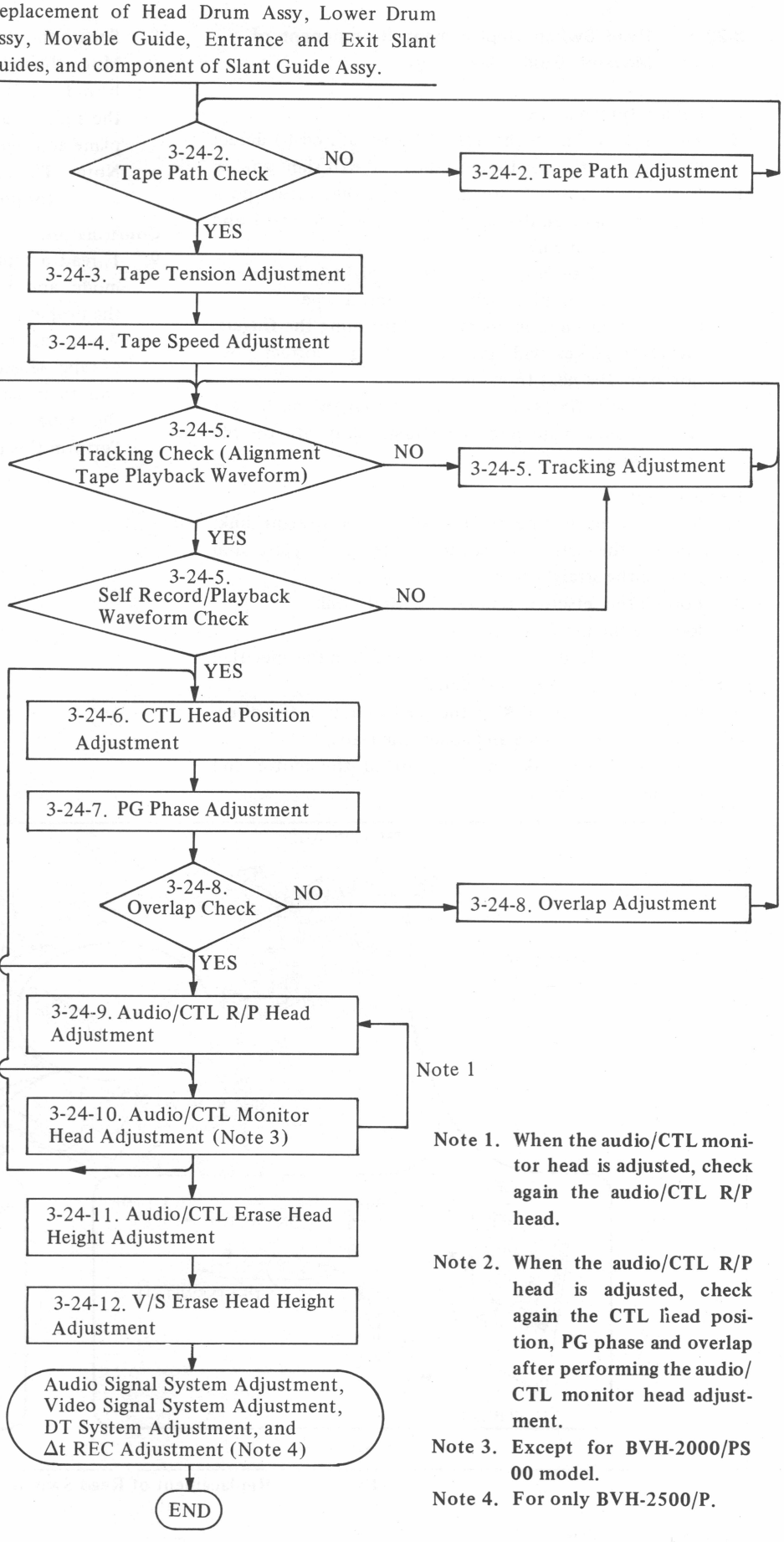
3-24-10. Audio/CTL Monitor Head Adjustment

3-24-11. Audio/CTL Erase Head Adjustment

Audio/CTL R/P Head Replacement

Audio/CTL Monitor Head Replacement

When the audio/CTL R/P head or audio/CTL monitor head is replaced, however the tracking adjustment is not required, the V/S erase head height adjustment may be skipped.

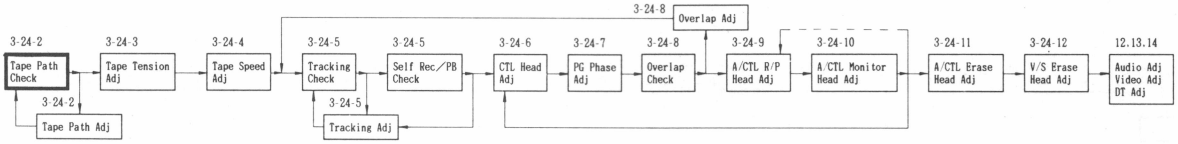


Note 1. When the audio/CTL monitor head is adjusted, check again the audio/CTL R/P head.

Note 2. When the audio/CTL R/P head is adjusted, check again the CTL head position, PG phase and overlap after performing the audio/CTL monitor head adjustment.

Note 3. Except for BVH-2000/PS 00 model.

Note 4. For only BVH-2500/P.



3-24-2. Tape Path Check & Adjustment

Check that the tape does not touch the reel flange strongly and there is no tape curl nor abnormal tape running in each mode of REC, F.FWD, REV x1 SHUTTLE and REW.

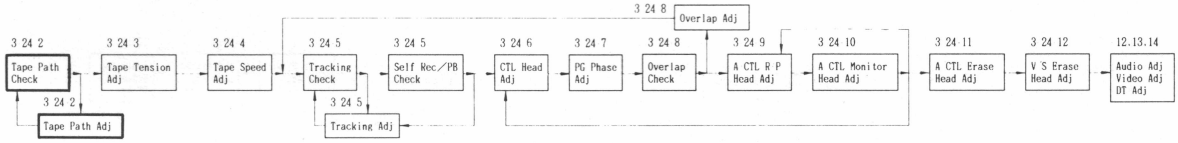
Tape Path Check

1. Place a reel whose flanges have little shake on the reel table and tape must be free from scraches and wrinkles on both edges.

2. Set in the REC mode and check the following points.
   - ① Supply reel:
     Tape touches the reel flange little.
   - ② Guide roller 1:
     Tape curls little, though the upper edge of the tape touches the guide flange.
   - ③ Guide roller 2:
     Tape curls little, though the lower edge of the tape touches the guide flange.
   - ④ Taper guide:
     Tape does not curl.
   - ⑤ Entrance and Exit Slant Guides:
     Tape does not curl along the guide flange.
   - ⑥ Guide post 3:
     Tape does not curl.
   - ⑦ Guide post 1:
     Tape does not curl, though the lower edge of the tape touches the guide flange.
   - ⑧ Timer roller:
     Tape curls little, though the upper edge of the tape touches the flange.
   - ⑨ T-tension arm
     Tape curls little, though the lower edge of the tape touches the flange.
   - ⑩ Take-up reel:
     Tape touches the reel flange little.

3. If the tape does not run in accordance with the above items, adjust the height of the reel tables or guides.

4. Check Step 2 in the order of the F.FWD, REV x 1 SHUTTLE and REW mode. If necessary, adjust the height of the reel tables or the guides.
   Note: If the height of the tape path on the timer roller varies in the REC, F.FWD or REW mode, adjust the slant of the timer roller so that the tape runs at the same height in the REC mode.



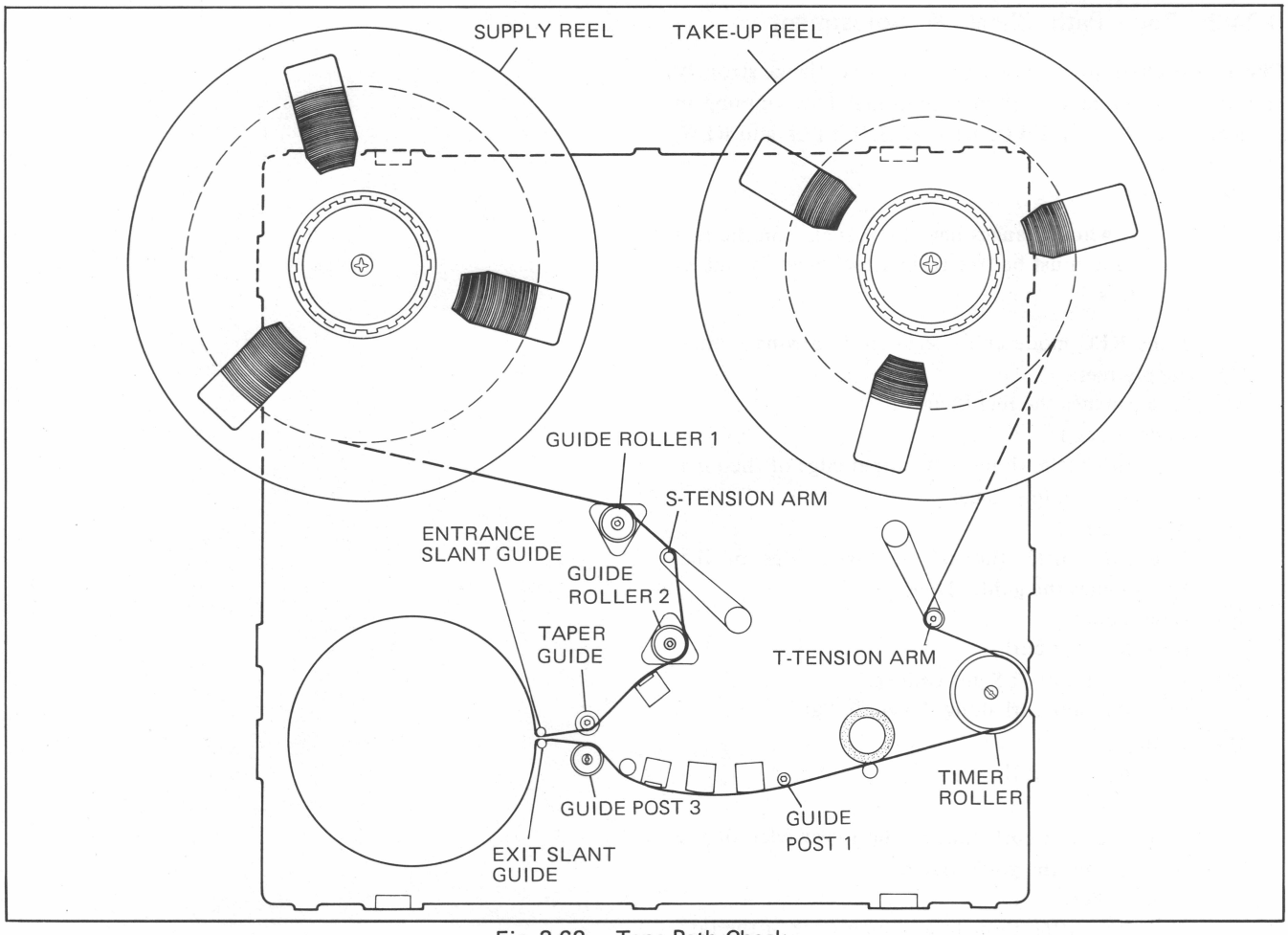


Fig. 3-62 Tape Path Check

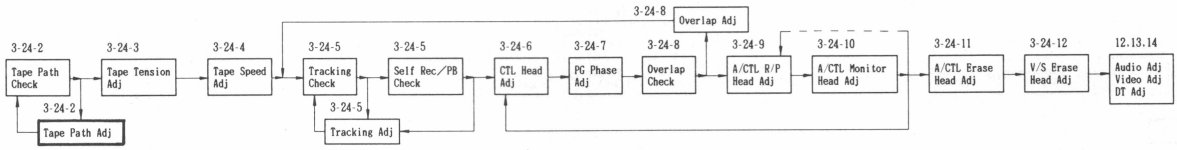
Guide Height Adjustment

The height of the guides is shown in Fig. 3-63.
When the part is replaced, mount it after adjusting the height of the guides to the value shown in the figure.

Note 1: Do not adjust the guides, especially guide roller 2, taper guide, entrance slant guide, exit slant guide, guide post 3 and guide post 1 unless absolutely necessary. When these guides have been adjusted, check the tracking and the height of the stationary heads.

Note 2: The entrance and exit slant guide should not be adjusted in this section.

Note 3: For the V/S erase head, audio/CTL erase head, auido/CTL R/P head and audio/CTL monitor head, the adjustment is not required in this section.



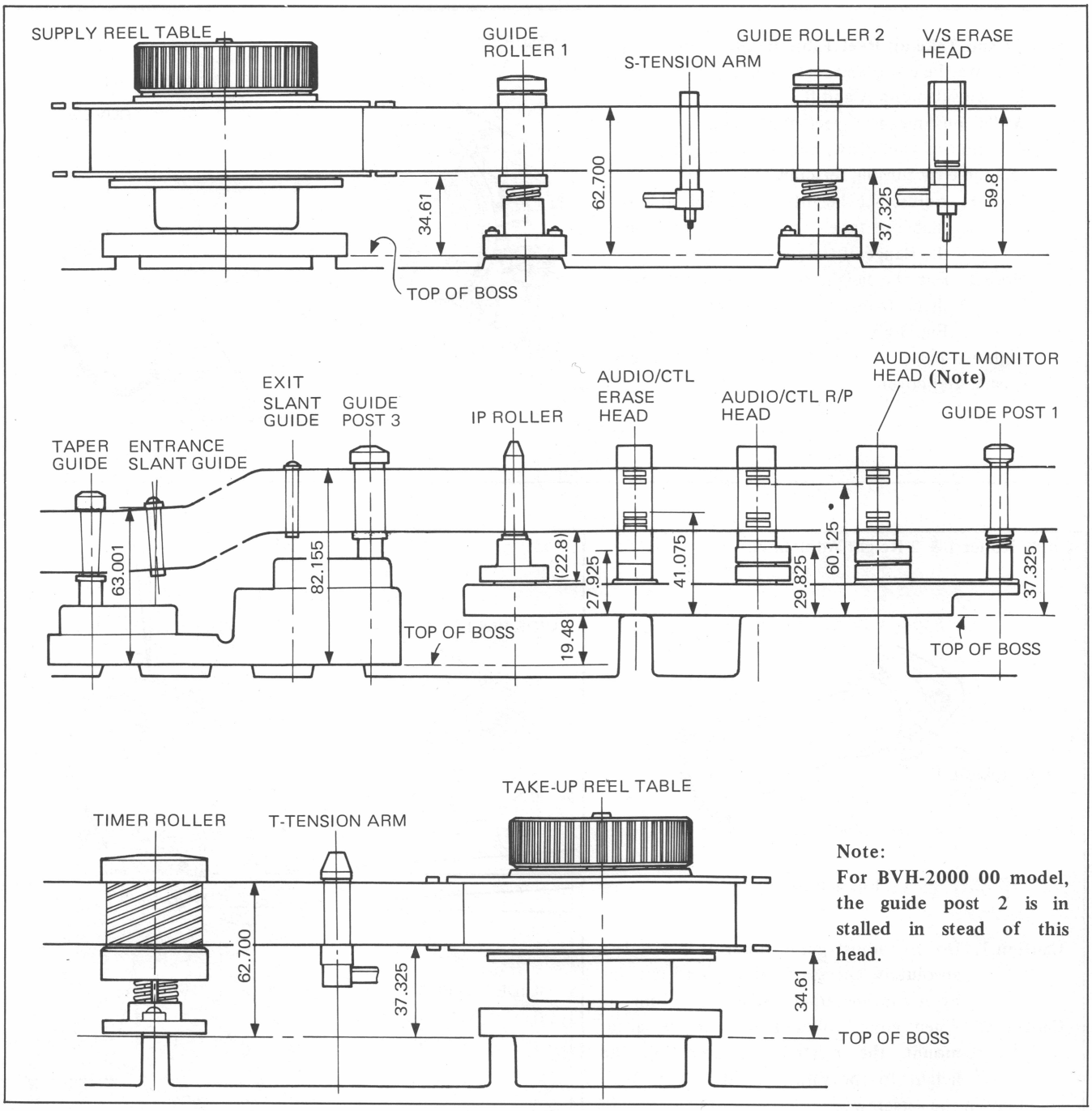
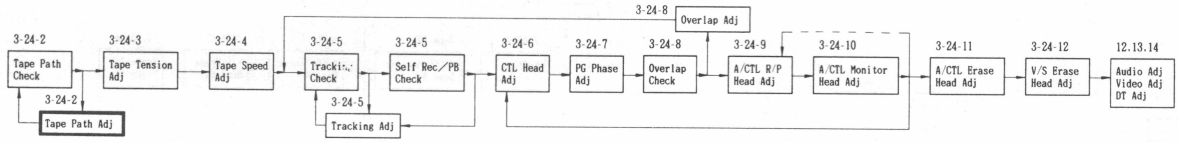


Fig. 3-63. Guide Height



Supply and Take-up Reel Table Height Adjustment

1. Remove the cover and reel washer.
2. Loosen setscrews A and B.
3. While pushing the reel table lightly in the direction of the arrow, adjust the height of the reel table by turning setscrew C.
   Note 1. Adjust the height of the reel table so that the tape runs without touching the flange of the reel.
   Note 2. For the height to the top of the reel sheet from the top of the boss, see Fig. 3-63.
4. Tighten setscrews A and B and mount the reel washer and cover.

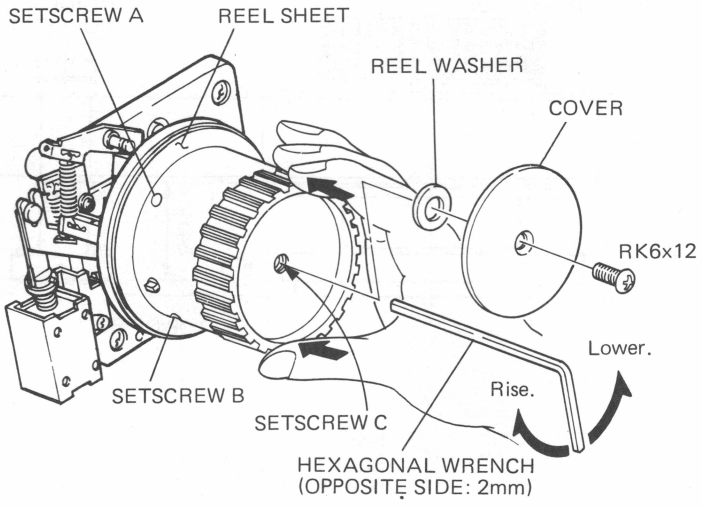


Fig. 3-64-1.

Guide Roller 1 & 2 Height Adjustment

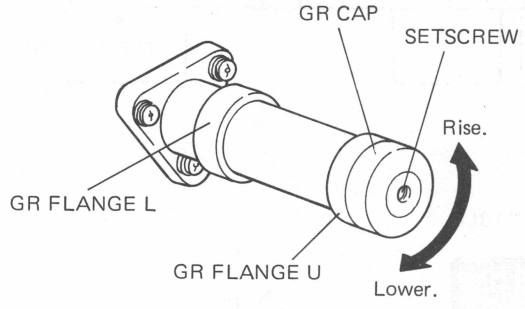


Fig. 3-64-2.

Caution 1. Do not adjust guide roller 1 & 2 unless absolutely necessary. If the curl remains by any means, finely adjust guide roller 1.

Caution 2. When guide roller 1 or 2 is replaced, mount the roller after adjusting the height to the value shown in Fig. 3-63.

1. Loosen the setscrew.
2. Adjust the height of the guide roller by turning GR cap.
   Note 1. Adjust guide roller 1 so that the tape touches GR flange U lightly without curl.
   Note 2. Adjust guide roller 2 so that the tape touches GR flange L lightly without curl.
3. Tighten the setscrew.

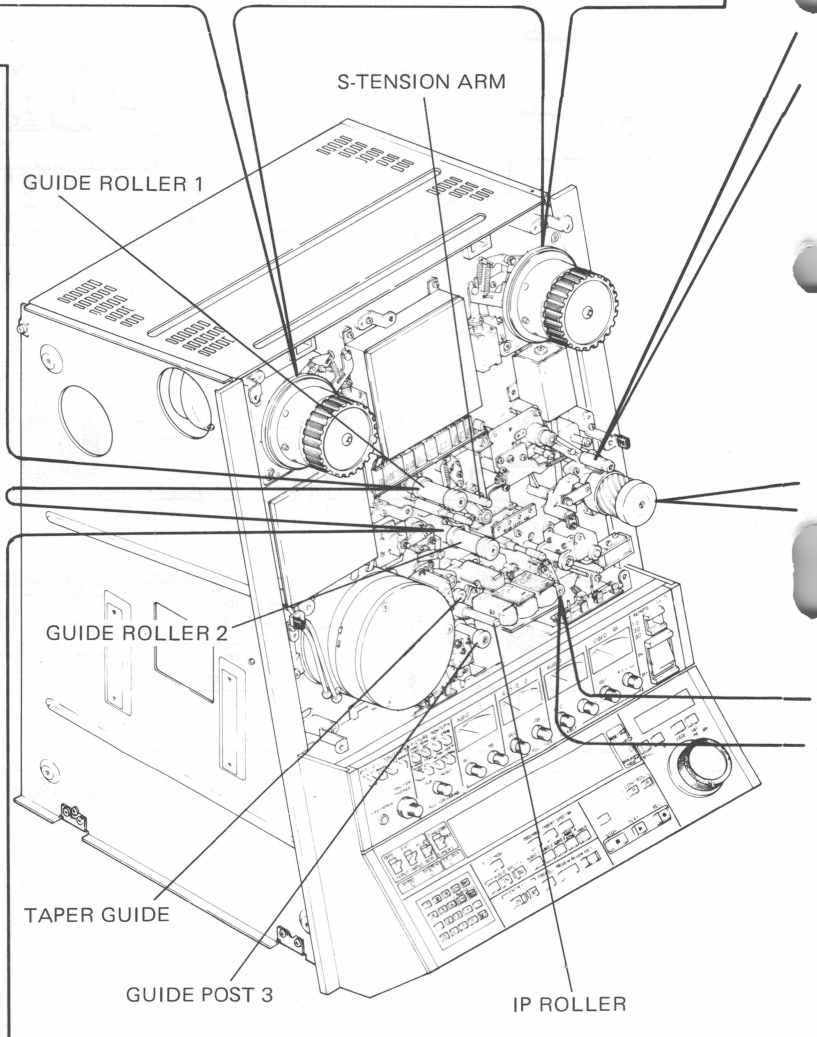


Fig. 3-64-3.

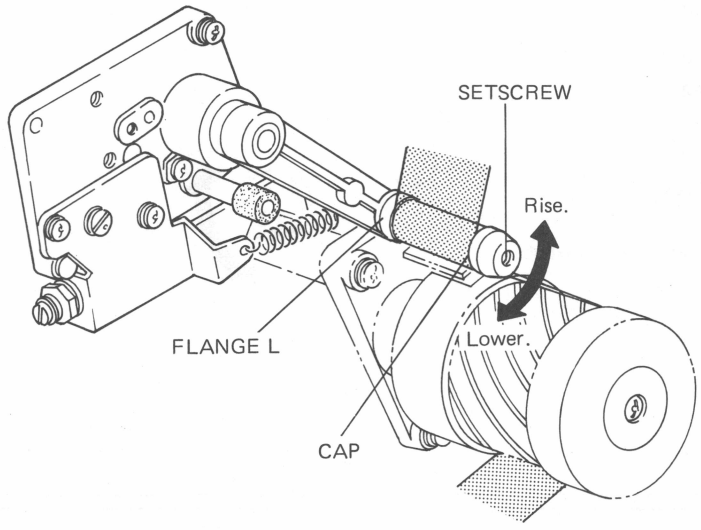


Fig. 3-64-4.

T-Tension Arm Height Adjustment

1. Loosen the setscrew.
2. Set the machine in the REC mode. While checking that the tape does not curl along the timer roller, adjust the height of T-tension arm by turning the cap so that the tape touches flange L.
3. Set the machine in the REV x 1 SHUTTLE mode. Adjust again that there is no tape curl along the timer roller and the curl becomes as small as possible along T-tension arm.
4. When the mode is changed from F.FWD to REV x 1 SHUTTLE, check that the curl does not change along the timer roller and T-tension arm. If changed, perform Step 2 through 4 again.
5. Tighten the setscrew.

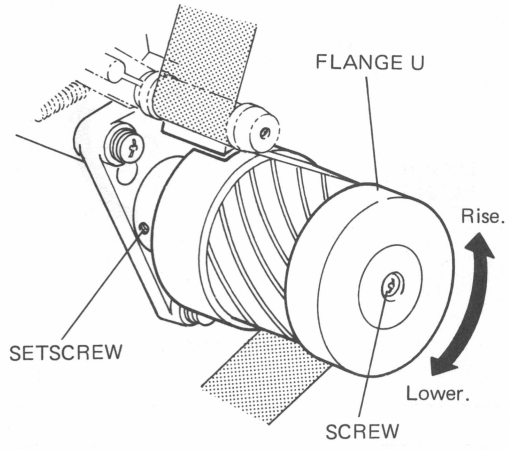


Fig. 3-64-5.

Timer Roller Height Adjustment

Note: The height of the timer roller and T-tension arm influences each other.
If necessary, adjust the height of T-tension arm also.

1. Check that the screw of flange U is tightened.
2. Loosen the setscrew.
3. Set the machine in the REC mode. Adjust the height of the timer roller by turning the flange U so that the tape touches flange U lightly without curl.
4. Tighten the setscrew and check that the screw of flange U is tightened.

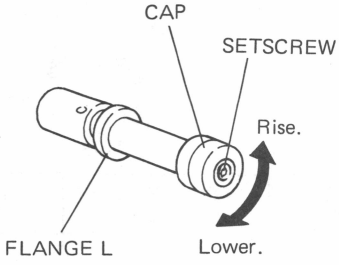


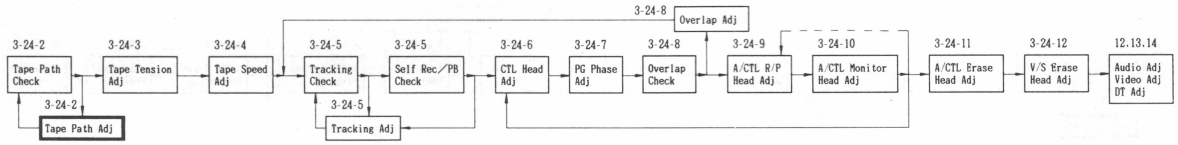
Fig. 3-64-6.

Guide Post 1 Height Adjustment

1. Loosen the setscrew.
2. Set the machine in the REC mode. Adjust the height of the guide by turning the cap so that the tape touches flange L lightly without curl.
3. Tighten the setscrew.

Note 1. Do not adjust the guide post 1 unless absolutely necessary.

Note 2. When the guide post 1 is replaced, mount it after adjusting the height to the value shown in Fig. 3-63.



Taper Guide Height Adjustment

Note: In this section, the height will need not to be adjusted especially unless no tape curls along the guide flange.

1. Loosen the set screw on the top of the taper guide.
2. Turn the cap of the taper guide so that the tape does not curl in REC mode.
3. Fix the cap by tightening the set screw loosened in step 1 with a torque of 7 to 8 kg-cm.

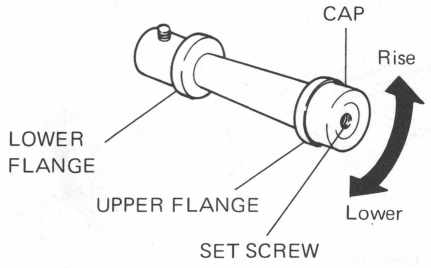


Fig. 3-64-7.

Guide Post 3 Height Adjustment

Note: In this section, the height will need not to be adjusted especially unless no tape curls along the guide flange.

1. Loosen the set screw driven in the upper flange.
2. Turn the height adjustment screw on the top of the upper flange so that the tape does not curl in REC mode.
3. While facing the set screw fastening the upper flange downward, tighten it securely.

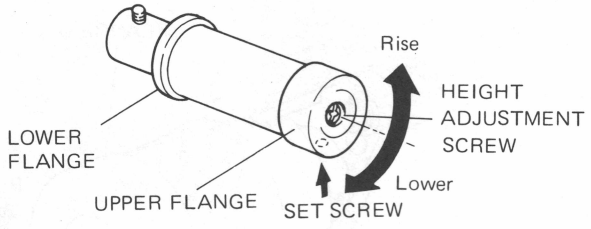


Fig. 3-64-8.

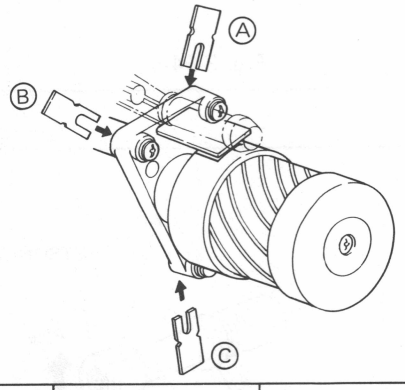
Timer Roller Slant Adjustment

If the height of the tape path along the timer roller varies in each of the REC, F.FWD or REW mode, this adjustment must be performed.

1. Prepare the spacers.

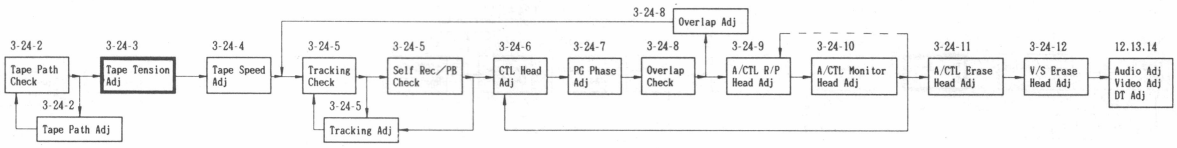
Thickness (mm)	Part No.
0.02	3-651-334-01
0.05	3-651-334-11
0.1	3-651-334-21

2. Insert the spacer into the position shown in Fig. 3-65 so that the height of the tape path in the F.FWD or REW mode is the same as that in the REC mode.



MODE	TAPE POSITION BEFORE ADJ.	SPACER POSITION
F•FWD	LOW	A
	HIGH	B
REW	HIGH	A & B
	LOW	C

Fig. 3-65. Timer Roller Slant Adjustment



3-24-3. Tape Tension Adjustment

Preliminary Information

A. This is the tape tension (FWD back tension) adjustment in the REC mode.

B. Prepare the tension adjustment tool.
Part No. J-6043-120-A

C. If the specific tape tension is not obtained when the following adjustment has been performed and when it is supposed that the cause is the malfunction of the potentiometer built in the S-tension arm assembly, replace the S-tension arm assembly, referring to section 3-12. The whole assembly should be replaced even if any component of the assembly is worn out or damaged except the guide shaft. If the guide shaft is worn out, replace it referring to section 6-5 or shift the worn surface of the shaft.

Check and Adjustment

1. Put the S arm adjustment weight on the guide shaft of the S-tension arm. Lift the arm by hand and then take the hand off slowly so that the arm vibrates freely. Wait until the arm stops naturally.
2. Connect the degital voltmeter to TP12 on RL-12 board. And turn on the power of VTR.
3. Check that the voltage at TP12 is 0V ± 0.03V. If necessary, adjust RV12 on RL-12 board.
4. Remove the weight from the S-tension arm and check that the voltage at TP12 is −2.6 ± 0.15V. If necessary, adjust RV1 on TT-01 board.
5. Put the adjustment weight again, and vibrate the arm freely and wait until the arm stops naturally. After the arm was stopped, confirm that the voltage at TP12 is 0 ± 0.03 volt. If not, adjust RV12 again, and then perform step 4. And if RV1 has been adjusted in step 4, perform this step 5 again.

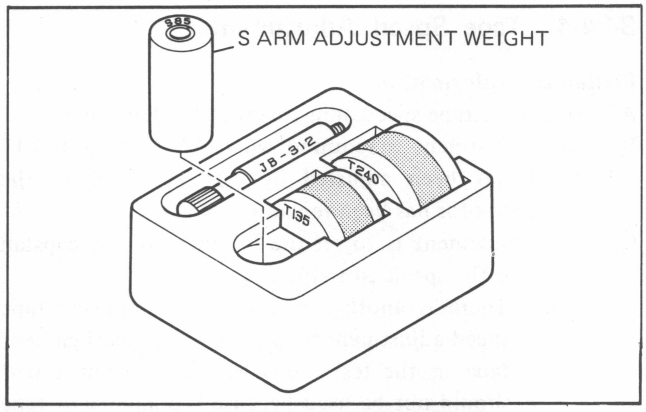


Fig. 3-66. Tension Adjustment Tool

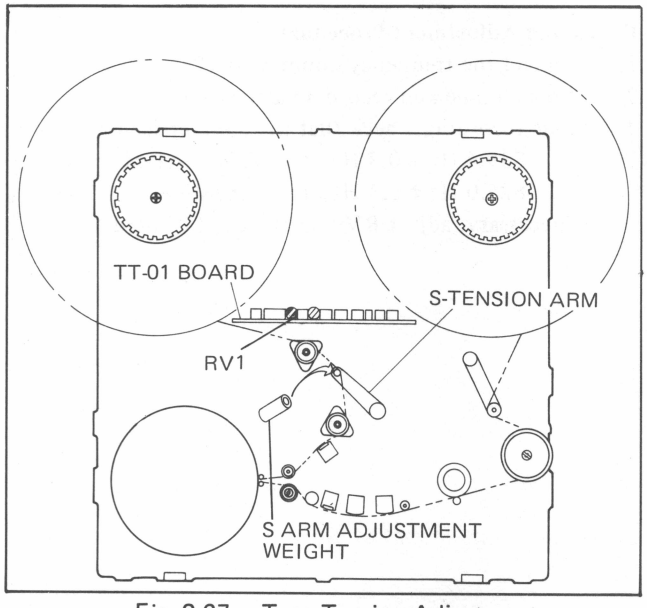


Fig. 3-67. Tape Tension Adjustment

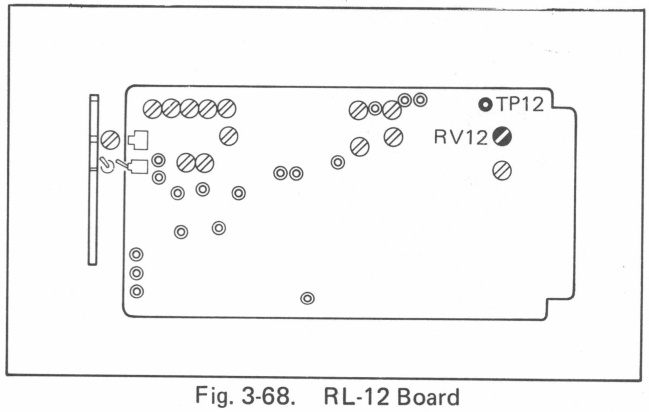
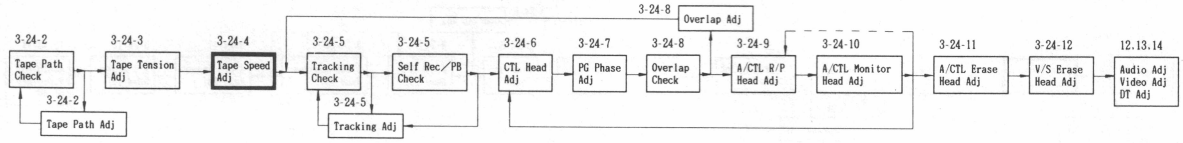


Fig. 3-68. RL-12 Board



3-24-4. Tape Speed Adjustment

Preliminary Information

A. This is the tape speed adjustment in the REC mode.

B. This adjustment is required when RV9 on the CD-17 board has been adjusted by mistake, RV9 or the capstan motor has been replaced.

C. This adjustment is to set the FG pulse of the capstan motor to the specified frequency.

Note: There is another way of performing the tape speed adjustment by playing back the alignment tape in the test mode B, but this adjustment should not be used because the alignment tape may be transformed with use.

Check and Adjustment Procedure

1. Connect the frequency counter to TP6.
2. Thread a tape and record a video signal.
3. While recording, check that the counter reads:
   839.4 Hz ± 0.3 Hz; for NTSC/PAL-M
   825.0 Hz ± 0.3 Hz; for PAL/SECAM
   If necessary, adjust RV9 on the CD-17 board.

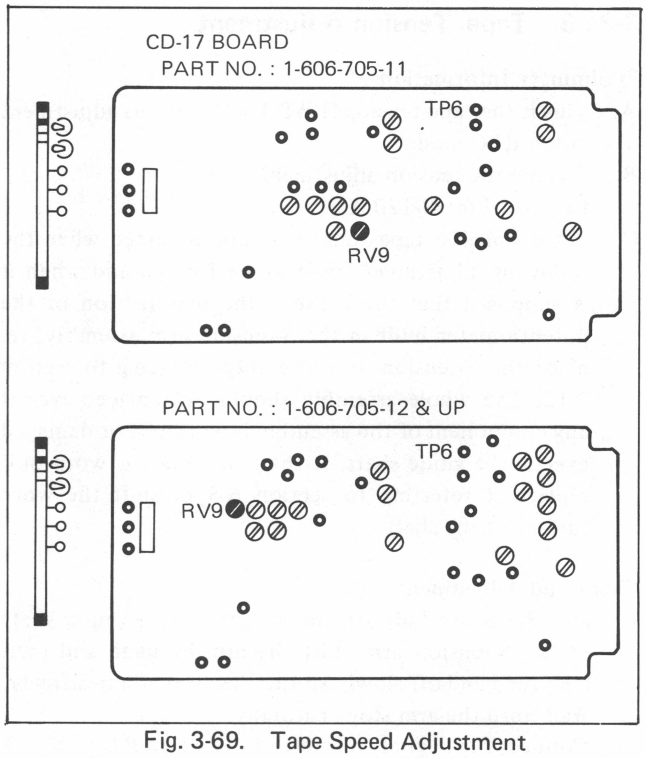


Fig. 3-69. Tape Speed Adjustment

3-24-5. Tracking Adjustment

A. Tracking Check (Alignment Tape Playback Waveform Check)

Note 1: If the upper drum has been replaced, run a tape in the PLAY or REC mode for about 20 minutes to break in the new upper drum before performing the tracking check.

Note 2: For the machines installed type A exit slant guide assembly (Refer to section 3-8 for the type), step 15 should be performed. If the result does not satisfy the specifications, adjust the gap referring to section 3-8-3 and perform the checks in this section again.

1. Set the TAPE/EE selector to TAPE.
2. Set the switch S4 on the DT board to ON.
3. Thread a tape on the machine.
   Note: Do not thread an alignment tape.
4. Connect an oscilloscope to TP5 on the EQ-02 board and TP1 on the TD-07 board, and set RV1 (R/P HEAD HEIGHT Cont.) on the TD-07 board to mid-rotation.
5. Set the machine in the REC mode. Turn RV2 on the TD-07 board so that the amplitude at TP5 on the EQ-02 board is maximum. Then confirm that the voltage at TP1 on the TD-07 board is 0 ± 100 mV.
6. Connect the oscilloscope TP1 and TP2 on the EQ-02 board.
7. Change the tape for an alignment tape.
8. Set the R/P MODE selector to FIELD or FRM and set the ADV switch on the CD-17 board to OFF.
9. Play back the alignment tape.
10. Check that the tape touches the upper flange of the taper guide lightly and the tape does not curl along the flange.
    If not, perform the adjustment procedures.
11. Check that the tape touches the lower flange of guide post 3 lightly and the tape does not curl along the flange. If not, perform the adjustment procedures.
12. Play back the WHITE segment of the alignment tape and maximize the RF amplitude by turning TRACKING knob.
13. Check that the VIDEO and SYNC RF waveform shown the specified value in Fig. 3-70-1. When the value is met, reset the switch S4 on the DT board to OFF. and if it is not met, perform the following adjustment procedure.
14. Push TRACKING knob and check that the RF waveform does not vary. If the waveform varies, the CTL head position adjustment is required.
15. By performing the following two steps, check the gap between the upper drum and the guide post where is 1 mm apart from the guide flange as shown in Fig. 3-70-2.
    ① 0.08-mm-gauge can be passed.
    ② 0.10-mm-gauge cannot be passed.

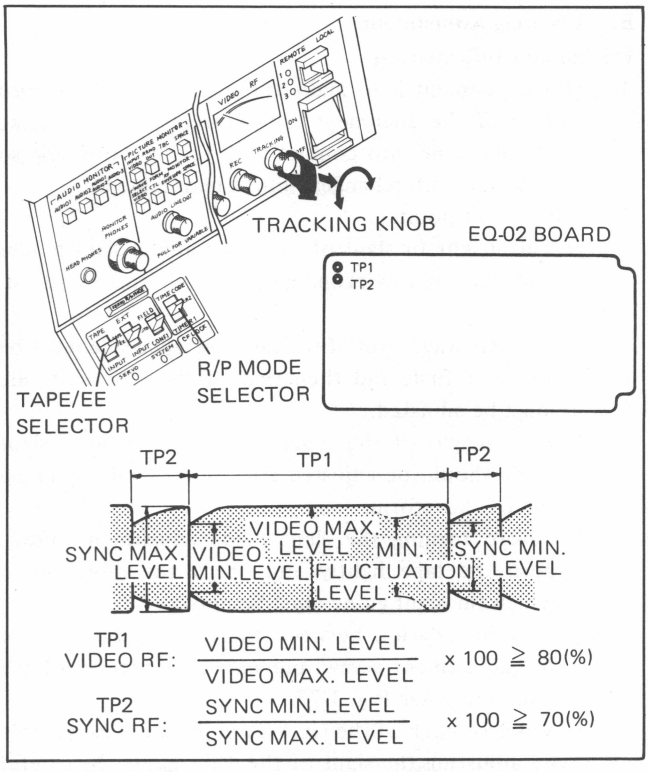


Fig. 3-70-1. Alignment Tape Playback Check

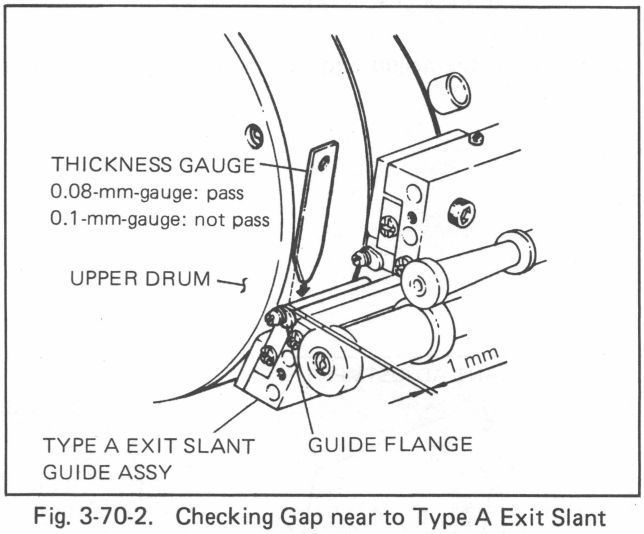
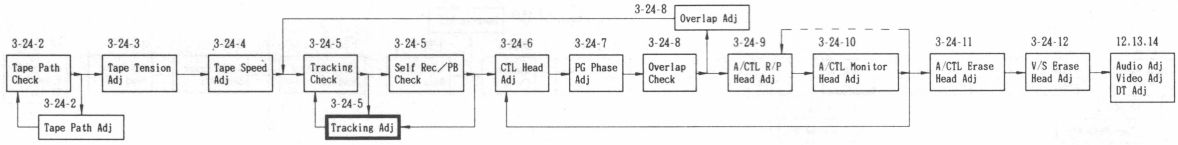


Fig. 3-70-2. Checking Gap near to Type A Exit Slant Guide Assy



B. Tracking Adjustment

Preliminary Information

1. This adjustment is to make the heads trace the record pattern of the alignment tape correctly and to make the heads come into contact with the tape properly so that the tape interchangeability is maintained.
2. Adjustment points
   - ① The height or slant of the taper guide, slant guides (entrance and exit) and guide post 3 must be adjusted.
   - ② The RF waveform of the tape entrance side must be adjusted first, and then that of the tape exit side must be adjusted.
   - ③ Each height of the taper guide and entrance slant guide should be adjusted alternately while checking the RF waveform.
   - ④ Before turning the slant guide adjustment screw, push the tape lightly and check the direction in which the slant guide must be moved.
   - ⑤ For the relation between the turning direction of the adjustment screw and moving direction of the slant guide, see Fig. 3-72.
   - ⑥ Make as much of the tracking adjustment as possible by adjusting the slant of the slant guide. Be careful that the guide flange does not press the tape excessively when turning the height adjustment screw.
   - ⑦ Each height of the guide post 3 and exit slant guide should be adjusted while checking the RF waveform.
3. To adjust the height and slant, use phillips screwdriver for M2.6.

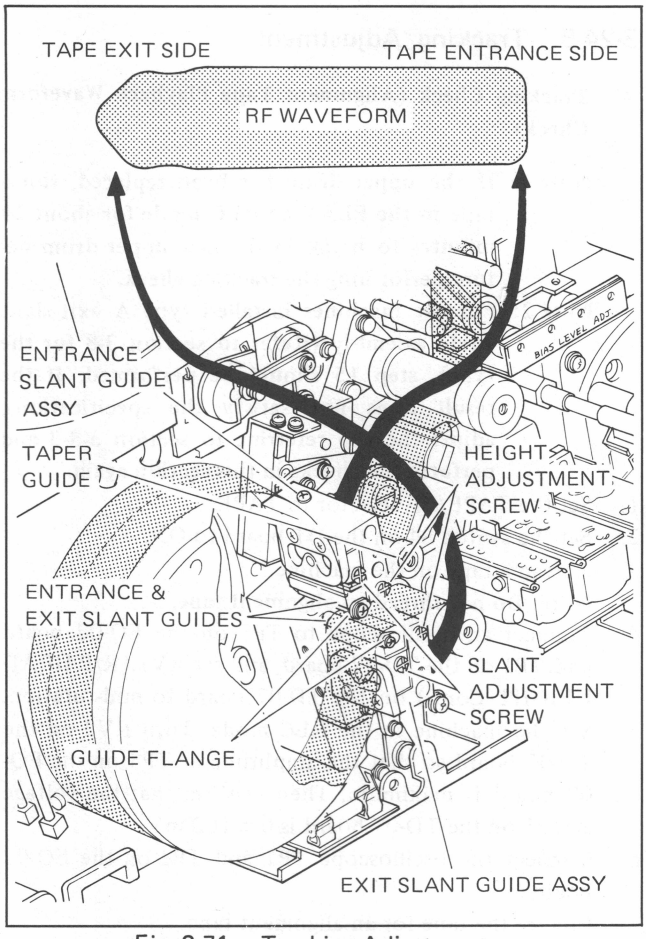


Fig. 3-71. Tracking Adjustment

4. If the tracking cannot be adjusted correctly owing to the wear of the entrance slant guide, exit slant guide or the tape guide section of the head drum assembly, replace the part in acordance with the following section.
   Head drum assembly: Section 3-6
   Entrance slant guides assembly: Section 3-8
   Exit slant guide assembly: Section 3-8
   Components of the slant guide assembly: Section 6-6

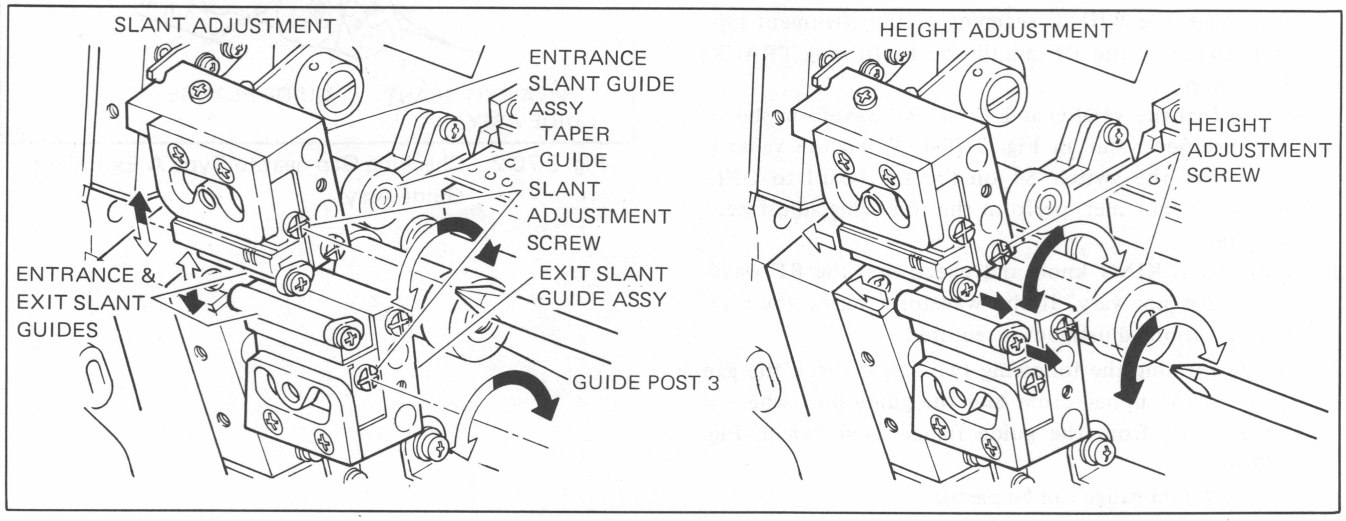
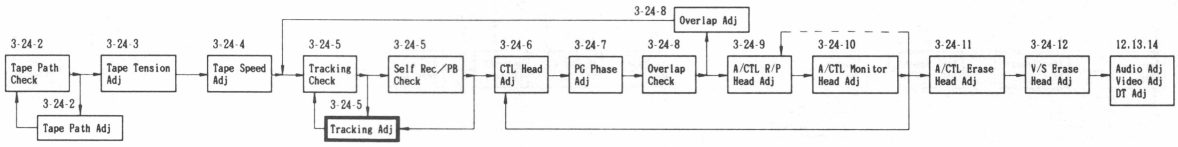


Fig. 3-72. Movement of Adjustment Screws and Slant Guides



Preparation before Adjustment

1. Check that R/P MODE selector is set to FIELD or FRM and ADV switch on CD-17 board is set to off. Connect the oscilloscope CH-1 to TP1 on EQ-02 board and connect CH-2 to TP-2.
2. Play back the WHITE segment of the alignment tape.
3. Adjust by turning the TRACKING knob so that the RF amplitude is 3/4 of its maximum.

Height Adjustment of Taper Guide

4. Loosen the set screw on the top of the taper guide, and then turn the cap so that the tape is positioned in the middle of the guide.
5. Loosen the locking screw of the entrance slant guide assembly 1/8 to 1/4 turn.
6. Turn the height adjustment screw of the entrance slant guide about 90 degrees counterclockwise, and confirm that the RF amplitude at the tape entrance side decreases 10 to 20 percent. If not, adjust the slant of the slant guide as follows.
   a By pushing Ⓤ or Ⓛ point of the running tape as shown in Fig. 3-73-2, find out the side whose RF waveform is similar to (a) of Fig. 3-73-1.
   b If the waveform is similar to (a) of Fig. 3-73-1 by pushing Ⓛ , turn the slant adjustment screw counterclockwise. If the waveform is similar to (a), by pushing Ⓤ , turn the screw clockwise.
7. Turn the cap of the taper guide clockwise slowly so that the RF waveform is as flat as possible. See (b) of Fig. 3-73-1.
8. Fix the cap by tightening the set screw on the top of the cap with a torque 7 to 8 kg-cm.
9. Confirm that the tape touches the upper flange of the taper guide but the tape does not curl along the flange.

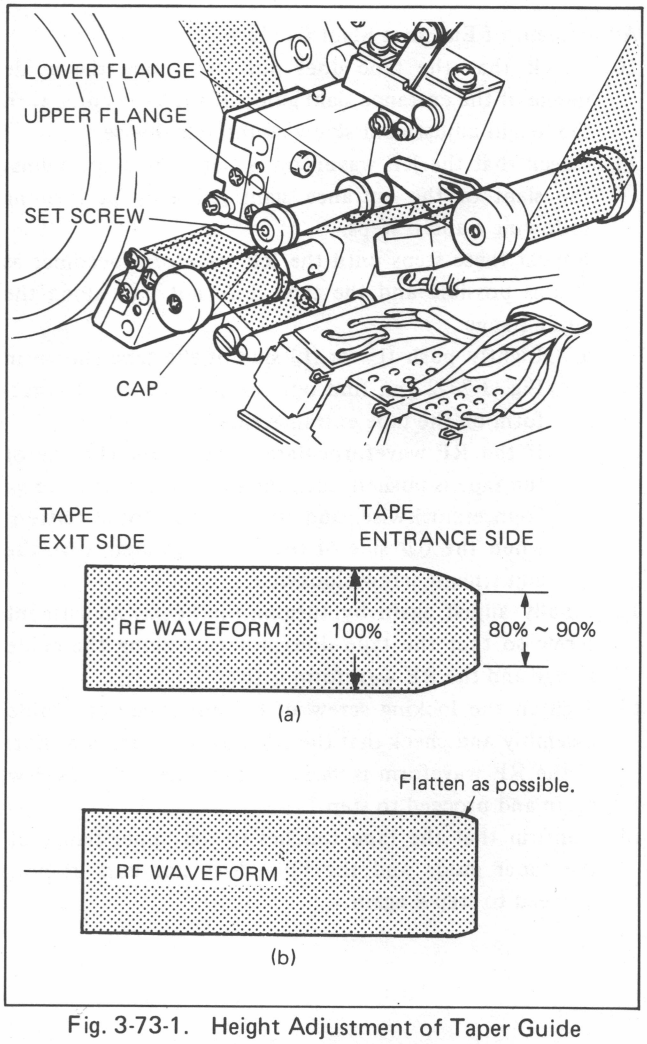
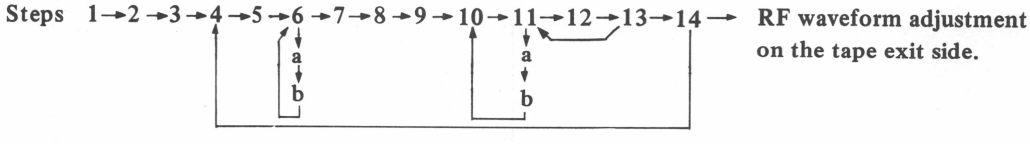
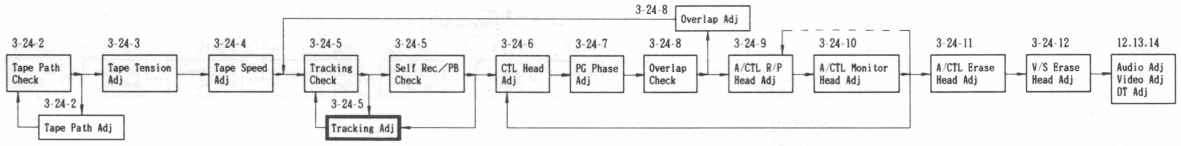


Fig. 3-73-1. Height Adjustment of Taper Guide

Note: The adjustment order of the RF waveform on the tape entrance side is as follows;





Adjustment of Entrance Slant Guide

10. Check that the tape does not curl along the guide flange of the entrance slant guide. If the tape curls, turn the height adjustment screw counterclockwise.
11. Check that the RF waveform is flat. If it is not, adjust the slant of the entrance slant guide by performing following a and b steps.
    Repeat these steps until the RF waveform becomes as flat as possible and the tape does not curl along the guide flange.
    a. Lightly push Ⓤ or Ⓛ side of the tape shown in Fig. 3-73-2 and find out the side whose RF waveform on the tape entrance side becomes flat.
    b. If the RF waveform flattens when the Ⓛ side of the tape is pushed, turn the slant adjustment screw counterclockwise and if the waveform flattens when the Ⓤ side of the tape is pushed, turn the adjustment screw clockwise.
12. Finally adjust again by turning the height adjustment screw so that the tape does not curl along the guide flange and the RF waveform is flat.
13. Tighten the locking screw of the entrance slant guide assembly and check that the RF waveform remains flat. If the RF waveform is varied, loosen the locking screw again and proceed to step 11.
14. Confirm that the tape touches to the upper flange of the taper guide and the tape does not curl. If not, proceed to step 4 again.

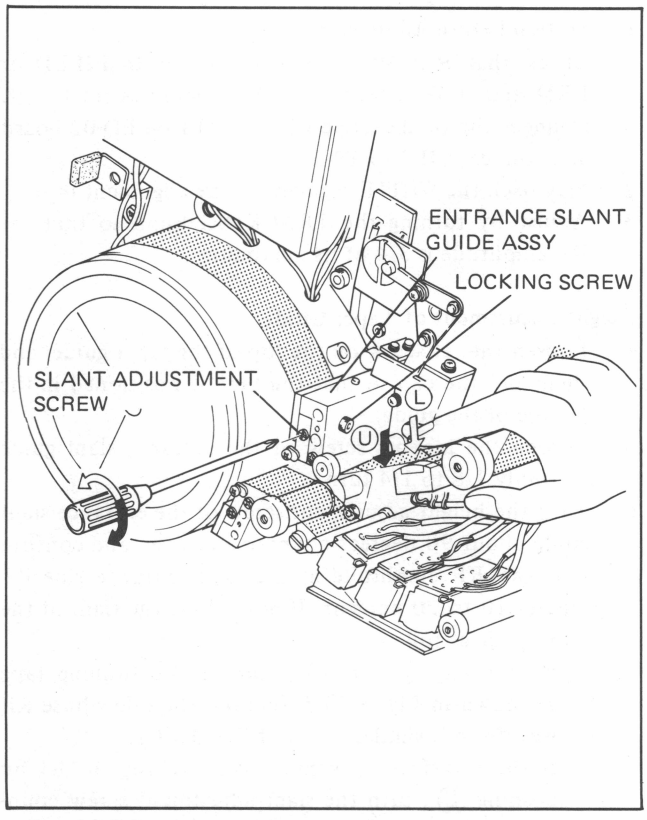


Fig. 3-73-2. Slant Adjustment of Entrance Slant Guide

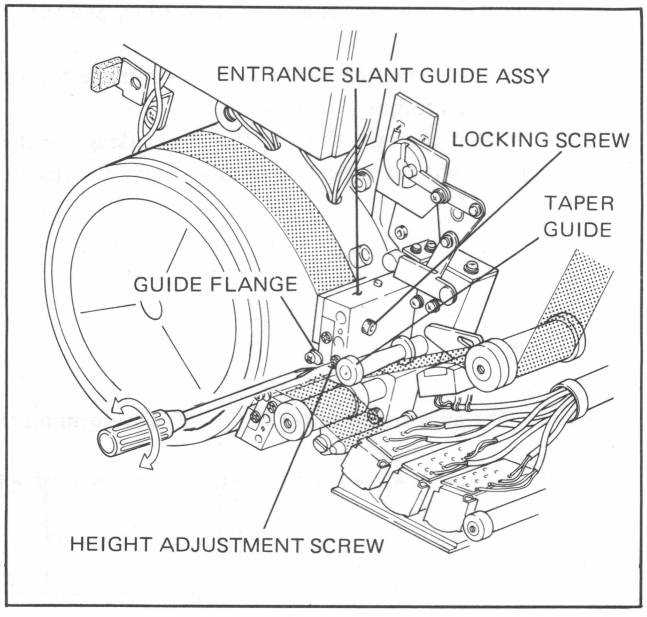
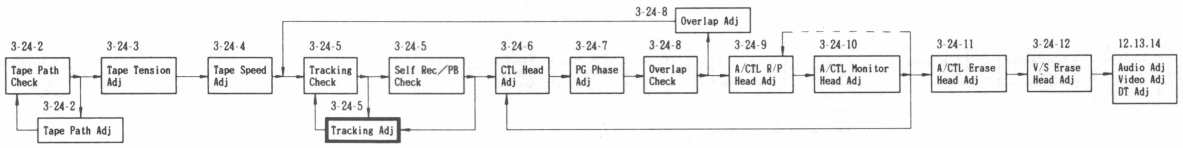


Fig. 3-74. Height Adjustment of Entrance Slant Guide



Height Adjustment of Guide Post 3

15. Loosen the set screw driven into the guide post 3.
16. Turn the height adjustment screw on the top of the guide post 3 so that the tape is positioned in the middle of the upper and lower flanges.

Slant Adjustment of Exit Slant Guide

17. Loosen the locking screw of the exit slant guide assembly 1/8 to 1/4 turn.
18. Lightly push the Ⓤ or Ⓛ side of the tape shown in Fig. 3-75 and find out the side whose RF waveform on the tape exit side becomes flat.
    If the RF waveform flattens when the Ⓛ side of the tape is pushed, turn the slant adjustment screw counterclockwise and if the waveform flattens when the Ⓤ side is pushed, turn the adjustment screw clockwise.

Height Adjustment of Exit Slant Guide

19. Check that the tape does not curl along the guide flange of the exit slant guide. If the tape curls, turn the height adjustment screw counterclockwise.
20. Check that the RF waveform is flat. If it is not, return to step 18 and adjust the slant again.
    Repeat steps 18 to 20 until the RF waveform becomes as flat as poosible and the tape does not curl along the guide flange.
21. Finally adjust again by turning the height adjustment screw so that the tape does not curl along the guide flange and the RF waveform is flat.
22. Tighten the locking screw of the exit slant guide assy and check that the RF waveform remains flat. If the waveform is varied, proceed to step 17 again.
    For the machines installed type A exit slant guide assembly, perform step 15 in Tracking Check.
23. While confirming that the RF waveform does not vary, turn the height adjustment screw of the guide post 3 so that the tape touches the lower flange of the guide post 3.
24. Tighten the set screw which was loosened in step 15.

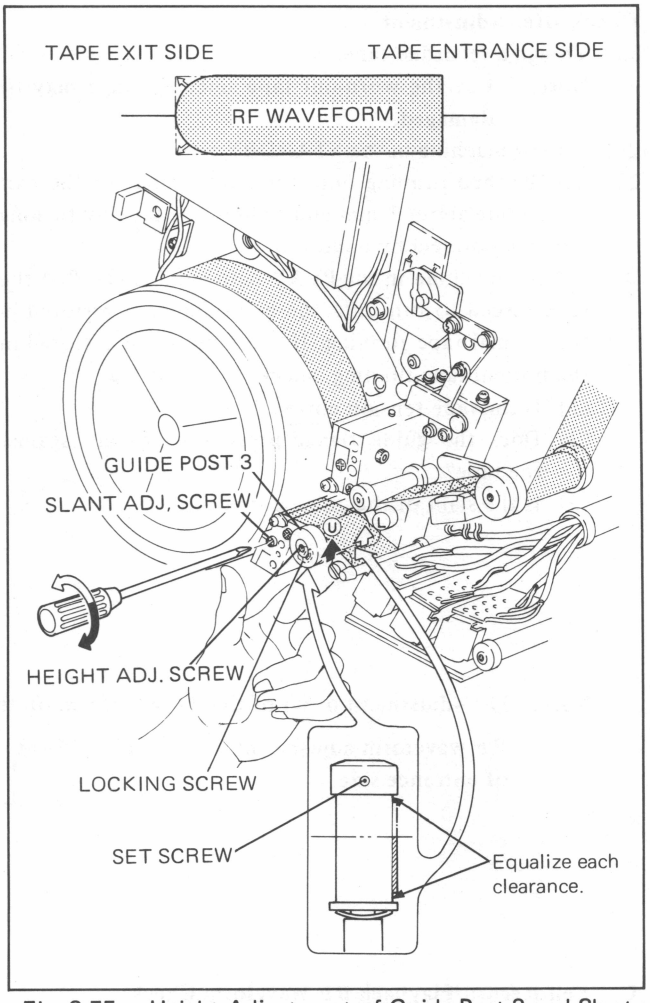


Fig. 3-75. Height Adjustment of Guide Post 3 and Slant Adjustment of Exit slant Guide.

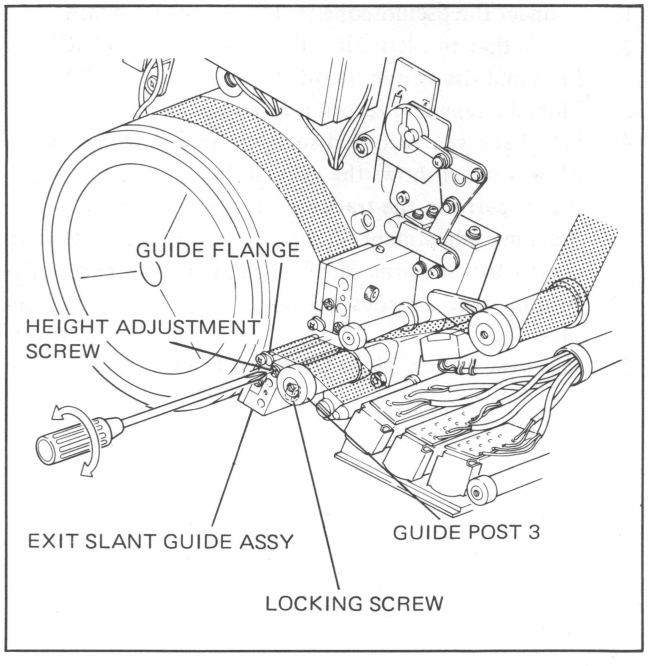
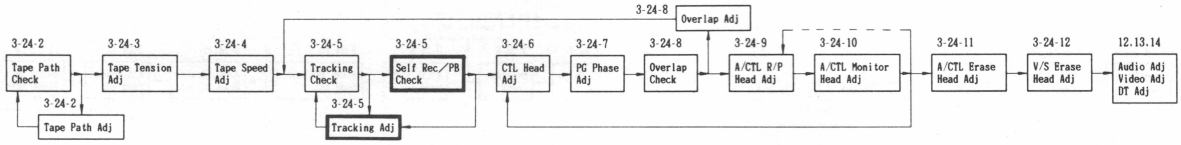


Fig. 3-76. Height Adjustment of Exit Slant Guide



Check after Adjustment

25. Thread a recorded tape.
    Note: Use the worn-out tape since the tape may be damaged.
26. Set the machine in the STANDBY mode.
27. Set the tape running onto the guide flange of the exit slant guide about 1 mm and tighten the tape by turning tape take-up reel by hand.
28. Set the machine in the PLAY mode and check that the tape forced to run onto the guide flange is restored in the normal tape running. If the tape is not restored in the normal tape running, check the following;
    (1) Is the tape tension correct?
    (2) Does the guide flange press too strongly against the tape?
    (3) Is the slant of the guide correct?

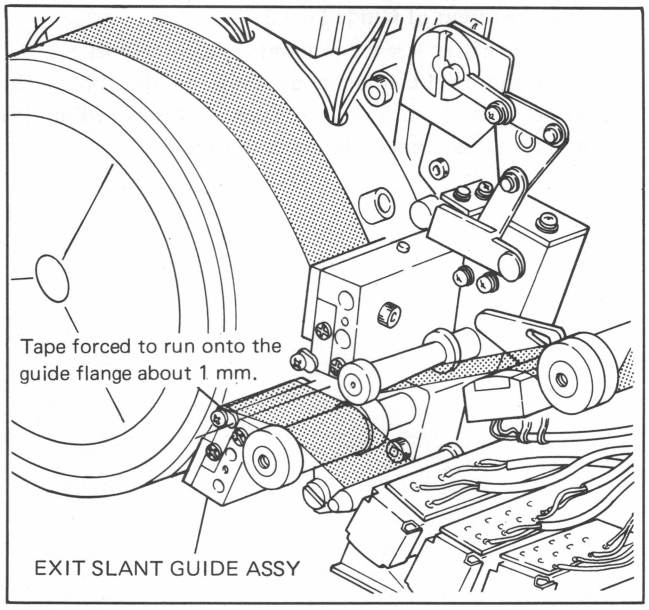


Fig. 3-77. Check of Tape running onto Guide Flange

Note: The adjustment order of the RF waveform on the tape exit side is as follows;

RF waveform adjustment of entrance side →15→16→17→18→19→20→21→22→23→24→25→26→27→28→END

C. Self Record/Playback RF Waveform Check

The contact of the tape with the rotary heads is checked by observing the self record/playback RF waveform.

1. Connect the oscilloscope to TP1 on EQ-02 board.
2. Check that the R/P MODE selector is set to FIELD or FRM and the switch S4 on DT board is set to ON.
3. Thread a tape and record a video signal.
4. Play back the recorded segment and confirm that the RF waveform shows the value in Fig. 3-78.
   If not, perform the tracking adjustment again.
   Tracking adjustment should be performed so that the playback waveform of an alignment tape and self recording tape satisfies the specified value at the same time.
5. Reset the switch S4 on DT board to OFF.

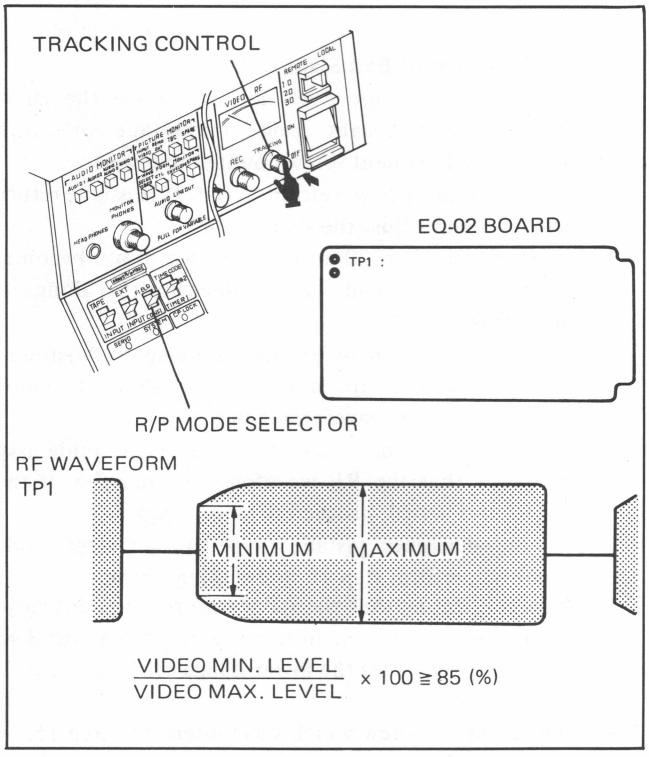
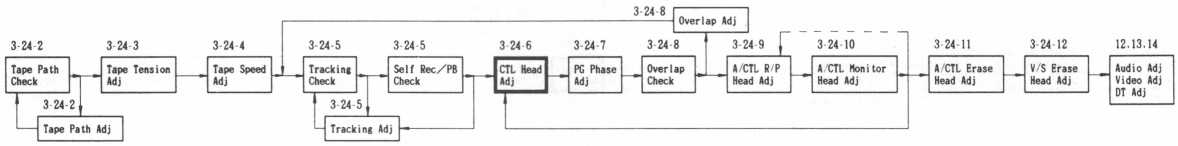


Fig. 3-78. Self Record/Playback RF Waveform Check



3-24-6. CTL Head Position Adjustment

A. If CTL head has been mounted on the incorrect position, the tape recorded by any other machine can not be played back correctly on this machine.

B. Since the PG phase deviates a great deal when CTL head is moved, the PG phase must be always adjusted after performing the adjustment of CTL head.

C. Before performing this adjustment, the DT head height must be adjusted correctly.

Check

1. When the height of DT head has not been adjusted, perform the steps 1 to 5 in item A of section 3-24-5.
2. Check that the R/P MODE selector is set to FIELD or FRM and that the switch S4 on the DT board is set to ON.
3. Confirm that ADV switch on CD-17 board is set to off and connect the oscilloscope to TP1 on EQ-02 board.
4. Play back the WHITE segment of the alignment tape.
5. Adjust by turning TRACKING knob so that the RF waveform shows maximum and check that the RF waveform remains unchanged when the TRACKING knob is pushed at the maximum RF amplitude. If the RF waveform changes, perform the following adjustment.

Adjustment

6. Remove the head shield cover.
7. Loosen the four screws fixing the head base 1/4 to 1/2 turn.
8. Check that TRACKING knob has been pushed and playback the WHITE segment of the alignment tape.
9. Insert the hexagonal screwdriver (2.5 mm to the opposite side) into the hole shown in Fig. 3-80. Pushing the head base in the direction of the arrow by hand, move the screwdriver right or left so that the RF waveform shows maximum.
10. Tighten the four screws loosened at Step 7.
11. Check that there is no clearance between pins and the head base shown in Fig. 3-80.
12. Check by turning TRACKING knob that the RF waveform does not change when the knob is pushed at the maximum RF amplitude.
    If it changes, repeat Steps 5 to 12.
13. Mount the head shield cover.
14. Reset the switch S4 on the DT board to OFF.

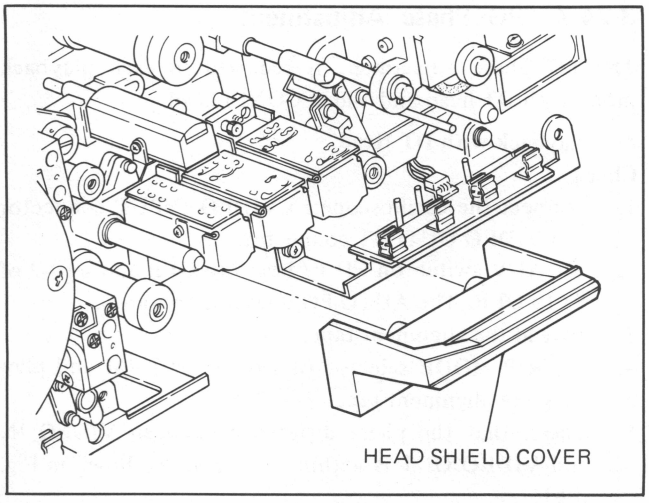


Fig. 3-79. Head Shield Cover Removal

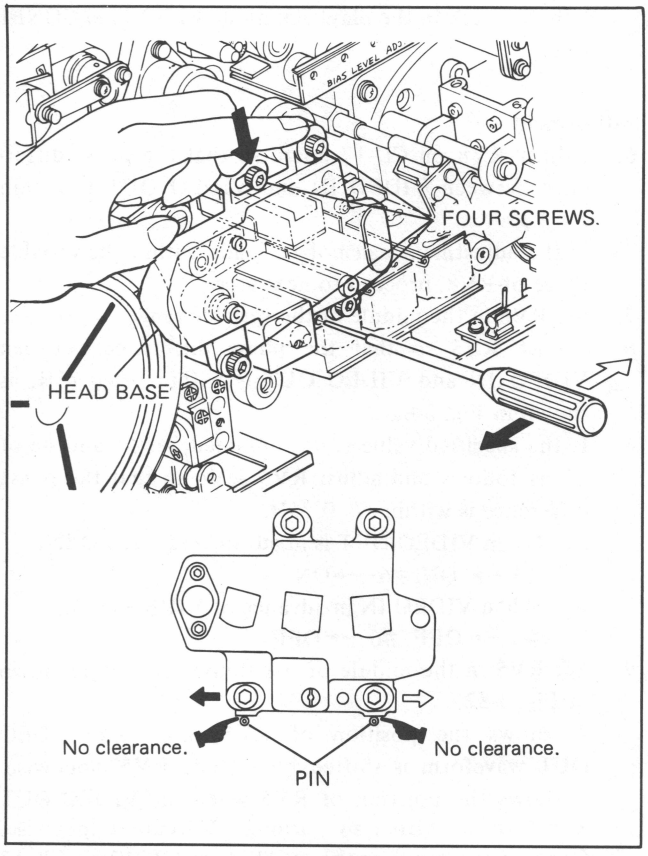
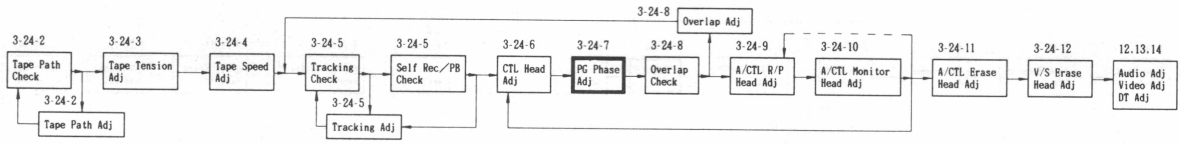


Fig. 3-80. CTL Head Position Adjustment



3-24-7. PG Phase Adjustment

The PG phase adjustment is required in each playback mode with DT head and Video CONFI head.

A. Playback with DT Head

Check

1. Connect the oscilloscope to VIDEO INPUT connector and VIDEO OUTPUT connector.
2. Set ADV switch on CD-17 board to OFF and set #2 of S3 to OFF (The AUTO PG does not operate.).
3. Thread the alignment tape.
4. Set R/P MODE selector to FIELD or FRM and play back the alignment tape.
5. Check that the phase difference between VIDEO IN and VIDEO OUT is within 1 ± 1 μsec, as shown in Fig. 3-81.
   If the specified value is not obtained, perform the following adjustment.
   If the specified value is obtained, proceed to Step 11 "Phase check in the playback mode with Video CONFI head".

Adjustment

6. Adjust RV8 on CD-17 board so that the phase difference between VIDEO IN and VIDEO OUT is within 1 ± 1 μsec.
   If the adjustment can not be made within the variable range of RV8, proceed to next step.
7. Set RV8 in the middle of the variable range.
8. Adjust RV5 so that the phase difference between VIDEO IN and VIDEO OUT is within +/−0.75H, as shown in Fig. 3-82.
   If the specified value is not obtained, set #5 and #6 of S3 as follows and adjust RV5 again so that the phase difference is within +/−0.75H.
   ⓐ When VIDEO OUT is in advance of VIDEO IN; #5 → ON, #6 → ON
   ⓑ When VIDEO IN in advance of VIDEO OUT; #5 → OFF, #6 → OFF
9. Set RV5 in the middle of positions A and B as shown in Fig. 3-82.
   A shows the position of RV5 when the VIDEO OUT waveform is shifted by turning RV5 clockwise. B shows the position of RV5 when the VIDEO OUT waveform is shifted by turning RV5 cunterclockwise. Connect the oscilloscope to TP15 and TP13 on CD-17 board.
   Adjust RV5 so that the positive-going edge at TP15 coincides with the nearest leading edge at TP13.
10. Adjust RV8 again so that the phase difference between VIDEO IN and VIDEO OUT is within 1 ± 1 μsec.

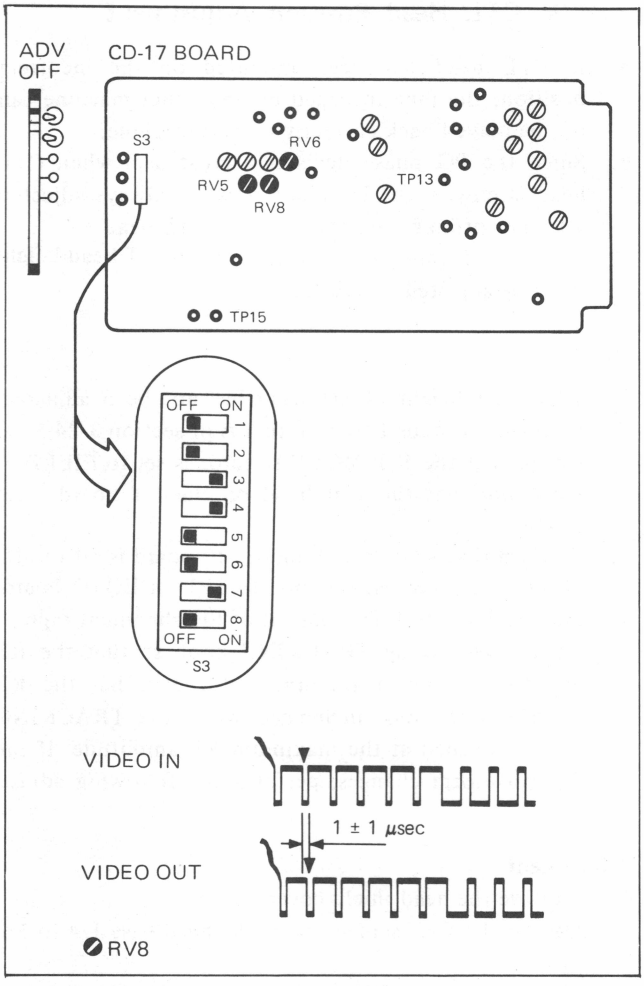
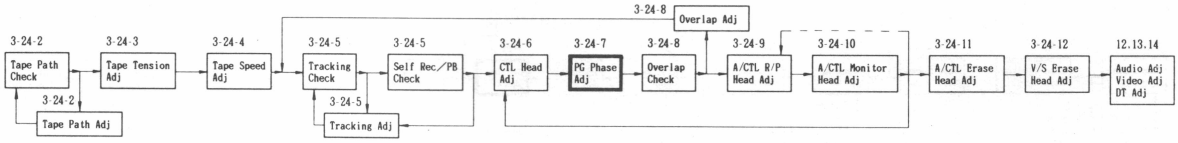


Fig. 3-81. PG Phase Adjustment in the Playback Mode with DT Head



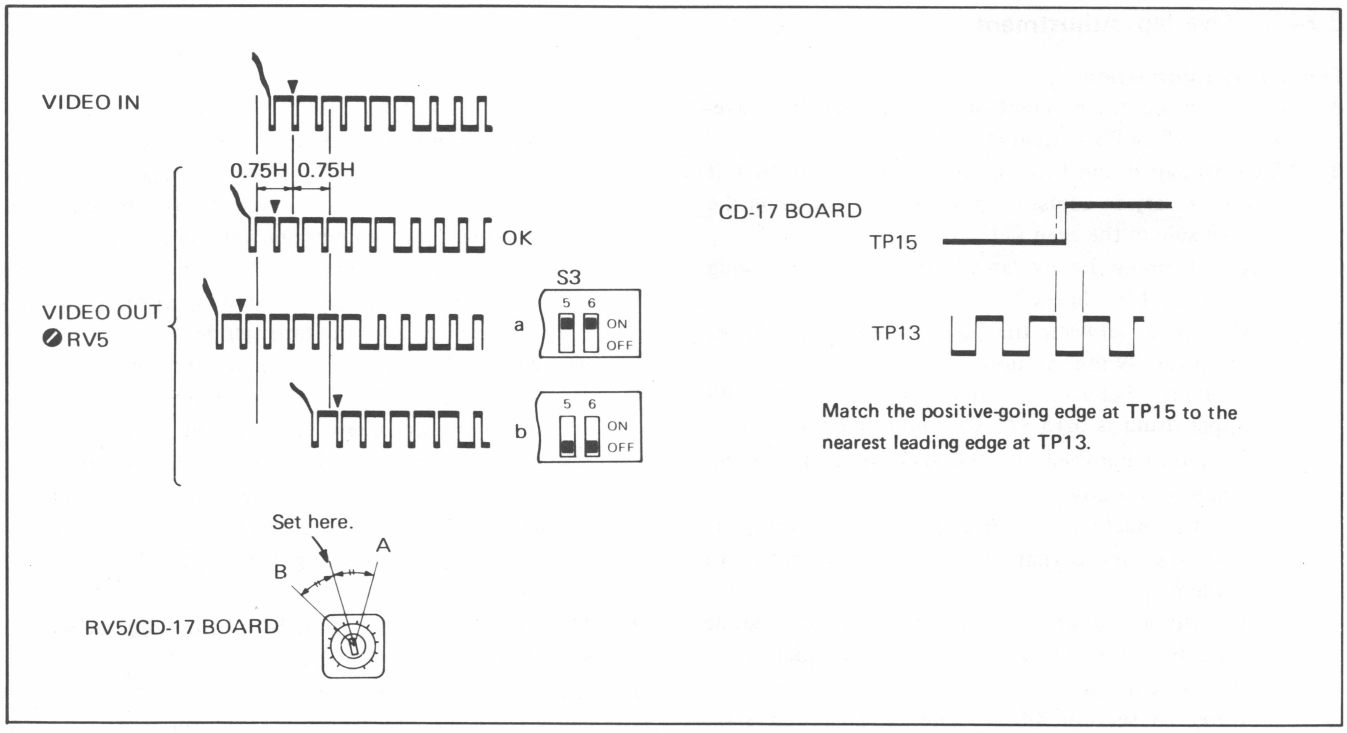


Fig. 3-82. PG Phase Adjustment in the Playback Mode with DT Head

B. Playback with Video CONFI Head

Check

11. Set R/P MODE selector to CONFI and play back the alignment tape.
12. Check that the phase difference between VIDEO IN (CH-1) and VIDEO OUT (CH-2) is within 1 ± 1 μsec. If the specified value is not obtained, perform the following adjustment.
    If the specified value is obtained, proceed to step 14.

Adjustment

13. Adjust RV6 on CD-17 board so that the phase difference between VIDEO IN (CH-1) and VIDEO OUT (CH-2) is within 1 ± 1 μsec.
14. Reset #2 of S3 on CD-17 board (The AUTO PG operates.).

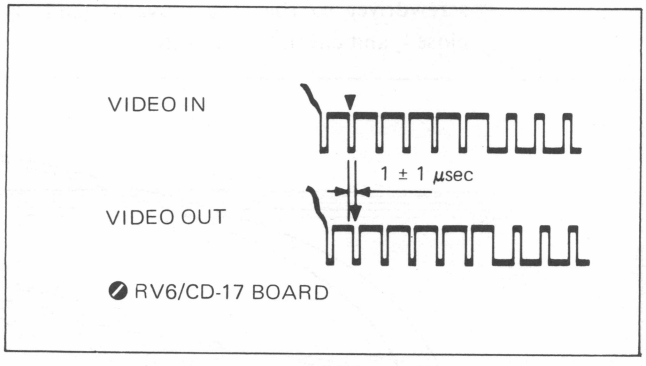
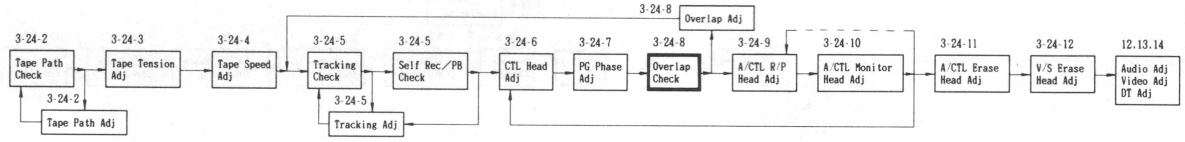


Fig. 3-83. PG Phase Adjustment in the Playback Mode with Video CONFI Head



3-24-8. Overlap Adjustment

Preliminary Information

A. Overlap means the segment of the playback RF waveform cut off by PB switching.

B. When overlap B and C in the odd field are adjusted, it is not necessary to adjust dropout A and overlap on the tape exit side in the even field.

C. After performing the overlap adjustment, the following clearance must be checked.

① Clearance between the guide bracket and upper drum is 0.09 mm or more.

② Clearance between the fence (entrance side) and upper drum is 0.15 +/− 0.05 mm. See Fig. 3-86-2.

③ Clearance between the exit slant guide and upper drum is as follows.

For the machines installed type B exit slant guide assembly: more than 0.25 mm at the middle of guide post.

For the machines installed type A exit slant guide assembly: 0.09 +/− 0.01 mm at 1 mm apart from the guide flange.

Refer to section 3-8 for the type of exit slant guide assembly.

Note: With power off, turn the threading motor of the movable guide with a flat-brade screwdriver so that the movable guide is closed, and check the clearance.

D. Adjustment Points

① When adjusting overlap C on the tape entrance side, loosen screw N so that the slant guide assy turns around screw M, and adjust the clearance between the guide bracket and upper drum.

② The clearance between the guide bracket and upper drum can be adjusted by turning the set-screw driven into the taper guide.

③ When adjusting overlap B on the tape exit side, loosen screw P so that the exit slant guide assy turns around screw Q, and adjust the clearance between the exit slant guide and upper drum.

④ The clearance between the exit slant guide and upper drum can be adjusted by turning the set-screw driven into the guide roller 3 (or guide post 3).

E. The thickness gauge is required for this adjustment.
Sony Part No. J-6041-670-A

F. After performing the overlap adjustment, be sure to check the tracking waveform in Section 3-24-5.

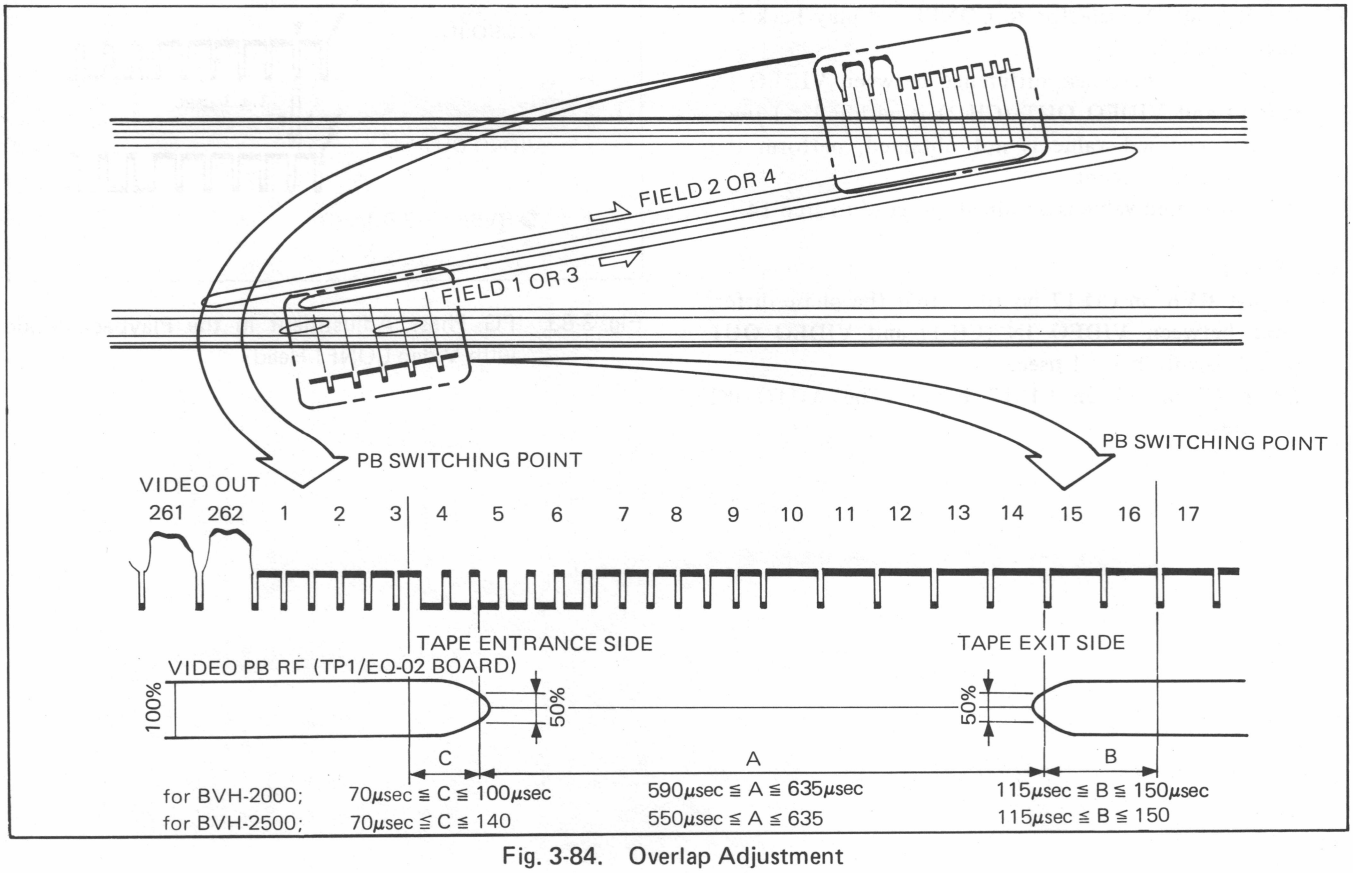


Fig. 3-84. Overlap Adjustment

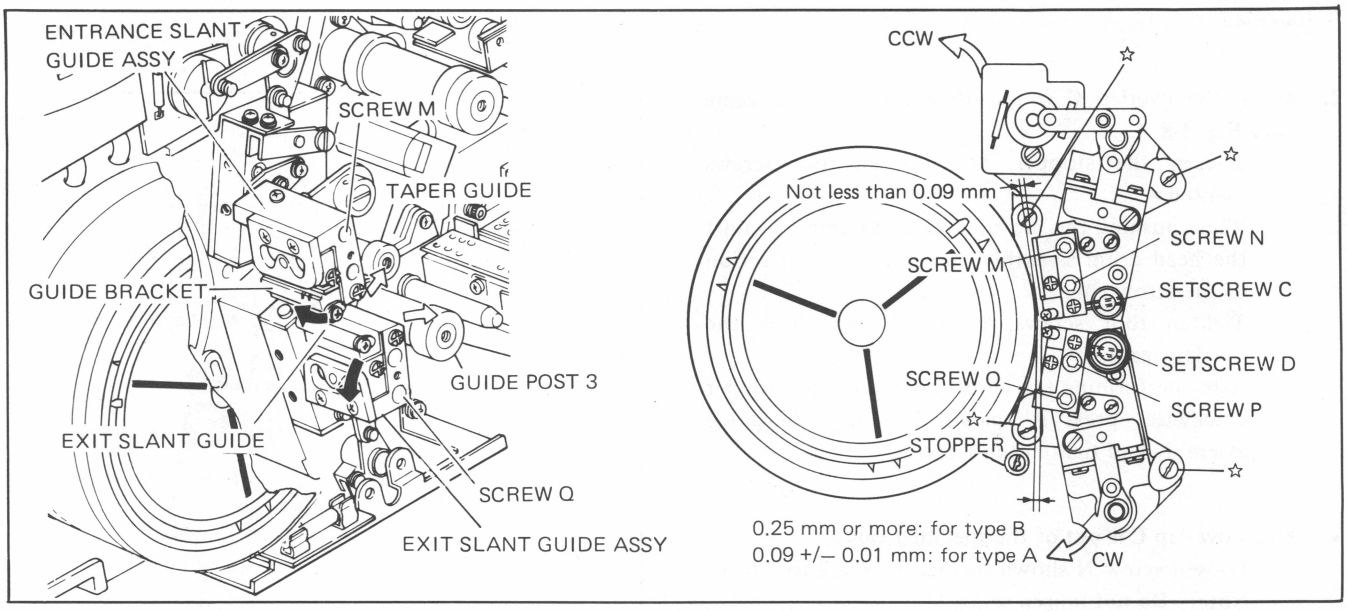


Fig. 3-85. Overlap Adjustment

Check

1. Connect the oscilloscope to TP1 on EQ-02 board and VIDEO OUTPUT connector.
2. Thread a tape.
3. Set R/P MODE selector to FIELD or FRM.
4. Record a video signal.
5. Play back the recorded segment and check that overlap B and C is within the range shown in Fig. 3-84.

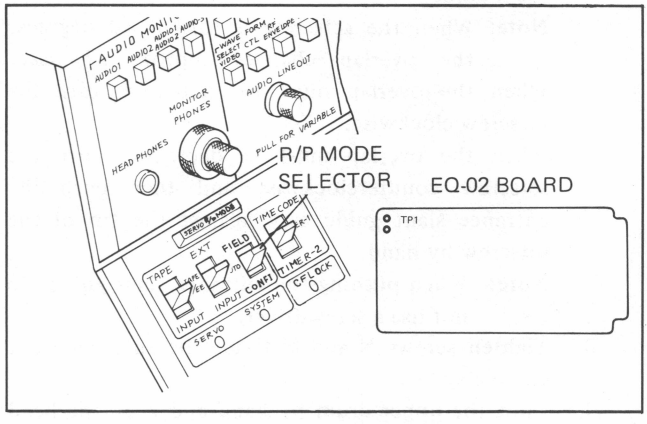


Fig. 3-86-1. Overlap Check

Adjustment

Note 1: For the machines installed the fence on the entrance slant guide assembly, if the whole assembly of the movable guide or the entrance slant guide assembly has been moved, check that the clearance between upper drum and fence, referring to Fig. 3-86-2. For the adjustment, refer to section 3-8-1.

Note 2: For the machines installed type A exit slant guide assembly, if the whole assembly of the movable guide or the exit slant guide assembly has been moved, check that the clearance between upper drum and guide post, referring to Fig. 3-86-2.

- **When the sum of the overlaps B and C is the following value and either overlap is less than the specified value.**
  For NTSC: 217 μsec or more
  For PAL : 287 μsec or more

1. When the overlap B is less than the specified value (See Fig. 3-85).
   a. Loosen four screws marked ☆.
   b. While pushing the movable guide assembly lightly to the head drum assembly, move it in the direction of the arrow CCW.
   c. Tighten four screws marked ☆ and check the overlap again.

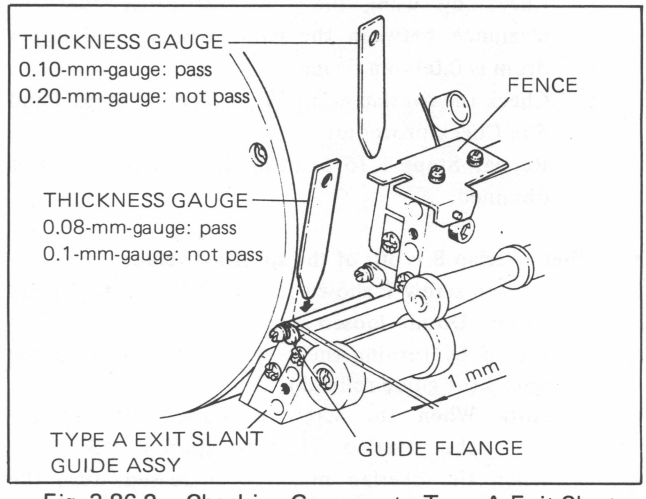
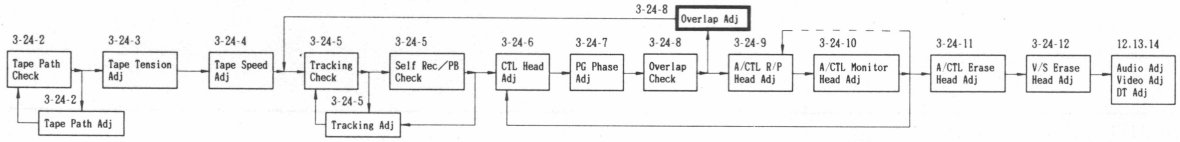


Fig. 3-86-2. Checking Gap near to Type A Exit Slant Guide Assy

   d. After performing the adjustment, turn the stopper clockwise, press it against the movable guide assembly and tighten the screw.

Note: When move the movable guide assembly 1 mm along the circumference of the drum, the overlap changes approx. 40 μsec.



2. **When the overlap C is less than the specified value (See Fig. 3-85).**
   a. Loosen the stopper, then loosen four screws marked ☆.
   b. While pushing the movable guide assembly against the head drum assembly, move it in the direction of the arrow CW.
   c. Tighten four screws marked ☆ and check the overlap again.
   d. After performing the adjustment, turn the stopper clockwise, press it against the movable guide assembly and tighten the screw.

- **When overlap C is out of the specified value;**
  1. Loosen screw N shown in Fig. 3-87 1/2 to 1 turn.
     Note: Do not loosen screw M.
  2. Adjust by turning the setscrew driven into the taper guide.
     Note: When the setscrew is turned 10 degrees, the overlap changes approx. 27 μsec.
     When the overlap must be increased, turn the setscrew clockwise.
     When the overlap must be decreased, turn the setscrew counterclockwise and then push the entrance slant guide assy against the tip of the setscrew by hand.
     Note: When pushing the entrance slant guide, do not use a screwdriver.
  3. Tighten screws N and M fixing the entrance slant guide assy.
  4. Turn the upper drum by hand and keep the head away from the entrance slant guide assy.
     Check by using the thickness gauge that the clearance between the guide bracket and upper drum is 0.09 mm or more.
  5. Check the overlap again by performing Steps 4 and 5 in Check procedure.
     Repeat Steps 1 to 5 untill the specified value is obtained.

- **When overlap B is out of the specified value;**
  1. Loosen screw P shown in Fig. 3-88 1/2 to 1 turn.
     Note: Do not loosen screw Q.
  2. Adjust by turning the setscrew driven into guide post 3 (or guide roller 3).
     Note: When the screw is turned 10 degrees, the overlap changes approx. 55 μsec.
     When the overlap must be increased, turn the setscrew clockwise.
     When the overlap must be decreased, turn the setscrew counterclockwise and then push the exit slant guide assy against the tip of the setscrew by hand.
     Note: When pushing the exit slant guide, do not use a screwdriver.

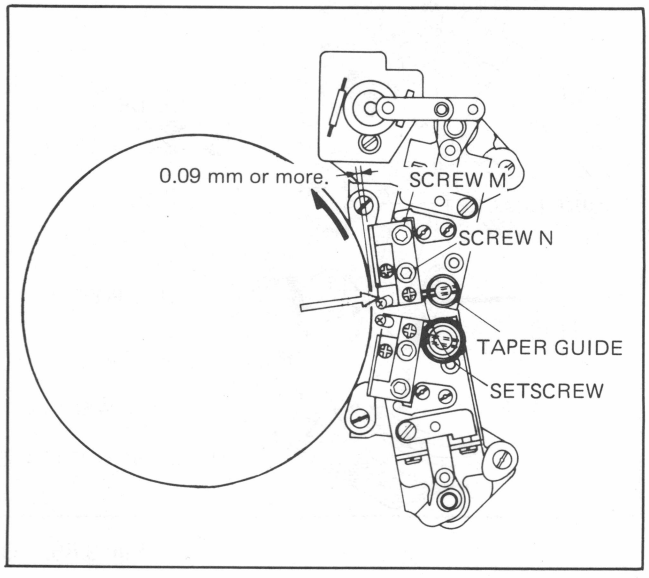


Fig. 3-87. Overlap C Adjustment

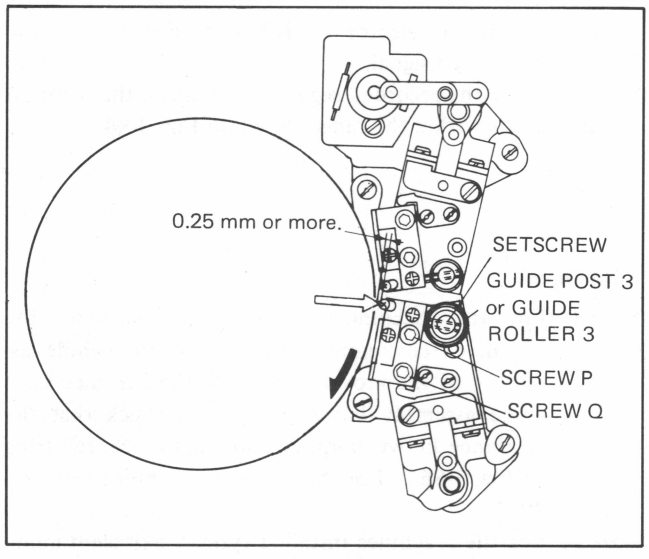
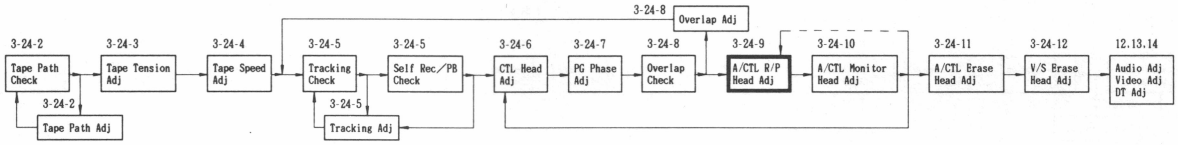


Fig. 3-88. Overlap B Adjustment

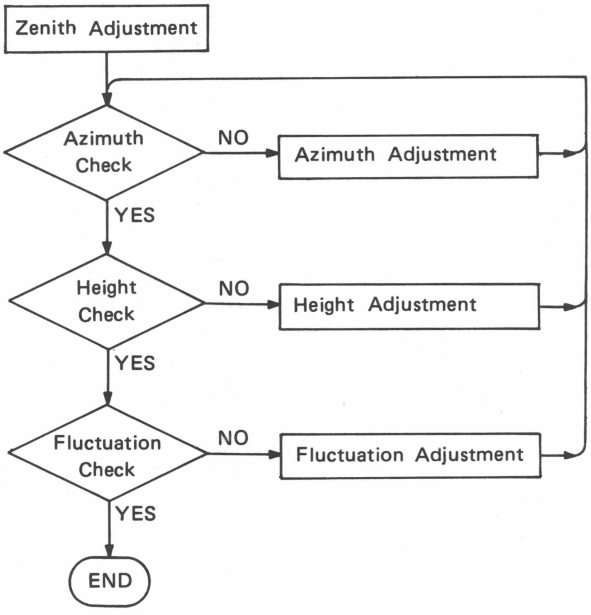
3. Tighten screws P and Q fixing the exit slant guide assy.
4. Turn the upper drum by hand and keep the head away from the exit slant guide assy.
   Check by using the thickness gauge that the clearance between the exit slant guide and upper drum is 0.25 mm or more.
5. Check the overlap again by performing Steps 4 and 5 in check procedure.
   Repeat Steps 1 to 5 until the specified value is obtained.

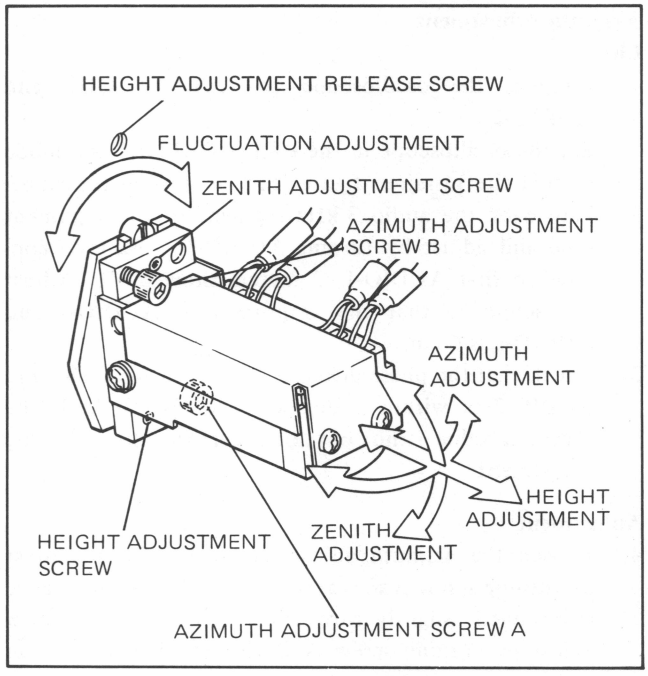


3-24-9. Audio/CTL R/P Head Adjustment

Preliminary Information

A. Perform the adjustment, following the flowchart below.





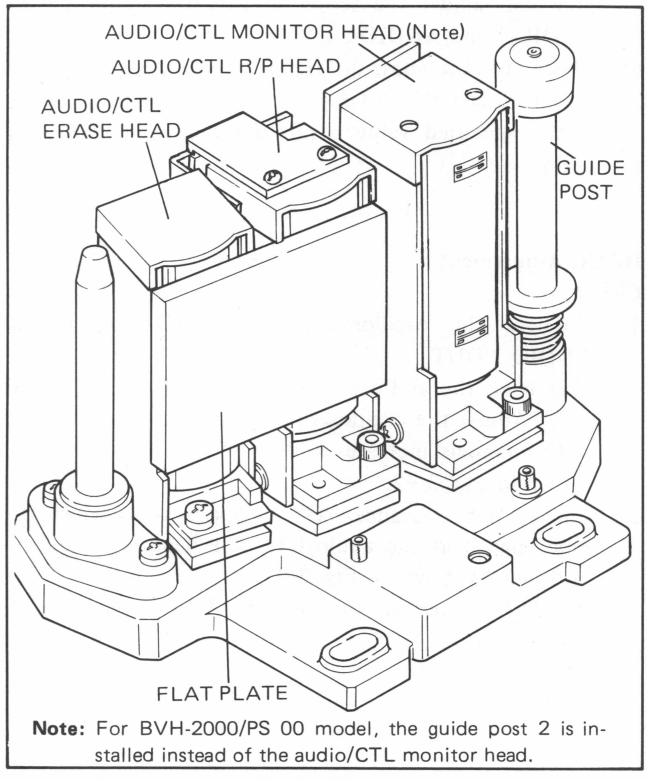
B. When the guides on the tape path have been adjusted, be sure to check the audio/CTL R/P head, following the above flowchart.

C. Prepare the following flat plate for zenith adjustment. Part No. J-6040-160-A

D. The zenith adjustment is not necessary except when the zenith adjustment screw has been made to turn or the azimuth adjustment screw has been tightened excessively.

Zenith Adjustment

1. Put the flat plate on both audio/CTL erase head and audio/CTL R/P head as shown in Fig. 3-89.
   Check that there is no space between the audio/CTL R/P head and the flat plate when the plate is put on the audio/CTL erase head without any space and also check that there is no space between the audio/CTL R/P head and the flat plate when the plate is put on the audio/CTL monitor head (for BVH-2000/PS/PM 02/04 model or BVH-2500) or the guide post 2 (for BVH-2000/PS 00 model) without any space.
2. If there is a space, eliminate the space by turning the zenith adjustment screw.



Note: For BVH-2000/PS 00 model, the guide post 2 is installed instead of the audio/CTL monitor head.

Fig. 3-89. Audio/CTL R/P Head Zenith Adjustment

Azimuth Adjustment

Check

1. Connect the oscilloscope to AUDIO-1 OUT and AUDIO-2 OUT.
   Set the oscilloscope in the EXT. HORIZONTAL mode so that the Lissajous figures can be seen on the scope.
2. Play back the audio 3 kHz segment of the alignment tape and adjust by turning AUDIO-1, 2 PB level controls so that AUDIO-1, 2 meters show 0 VU. Adjust the scope so that the amplitude of AUDIO-1 and AUDIO-2 is 6 cm.
3. Check that the phase difference between AUDIO-1 and AUDIO-2 is within 5 degrees. See Fig. 3-90. If the specified value is not obtained, perform the following adjustment.

Adjustment

4. Loosen the azimuth adjustment screw B and adjust by turning screw A so that the specified phase difference is obtained. Slightly turn screw B clockwise and then adjust by turning screw A so that the specified phase difference is obtained.
   Repeat the same procedure until both screws are tightened completely and finally check that the specified value is obtained.
   Note: The screws should be tightened with 6 to 8 kg•cm torgue.
5. Play back the audio 15 kHz segment of the alignment tape and adjust the scope so that the amplitude of AUDIO-1 and AUDIO-2 is 6 cm.
6. Check that the phase difference between AUDIO-1 and AUDIO-2 is within 30 degrees. See Fig. 3-91.
   If the specified value is not obtained, repeat Step 4 again.

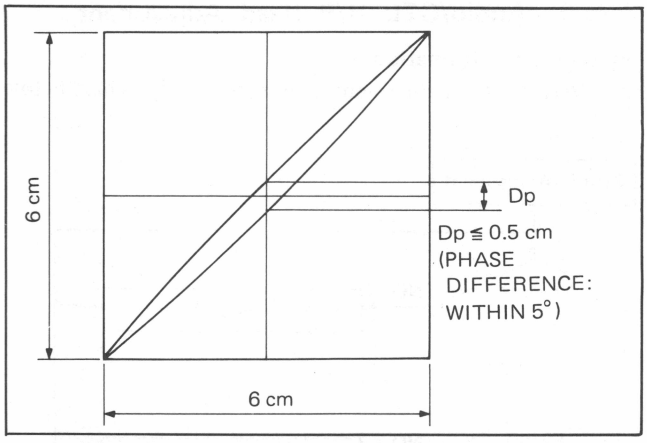


Fig. 3-90. Audio/CTL R/P Head Azimuth Adjustment of Audio 3 kHz Playback

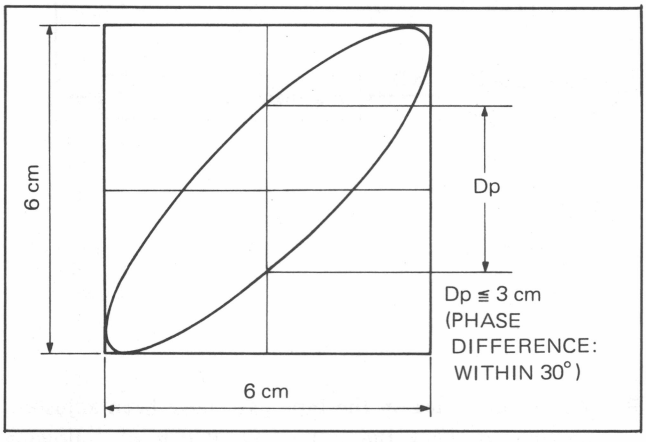


Fig. 3-91. Audio/CTL R/P Head Azimuth Adjustment of Audio 15 kHz Playback

Height Adjustment

Check

1. Connect the oscilloscope to AUDIO-1 OUT and AUDIO-2 OUT.
2. Play back the audio 3 kHz segment of the alignment tape. Adjust the oscilloscope so that the amplitude of both channels increases and it is equal. Observe "G" shown in Fig. 3-92.
3. Check that clearance "G" becomes wide when the tape edge near the audio/CTL R/P head is pushed up or down, as shown in Fig. 3-93.
   If "G" becomes narrow, perform the following adjustment.

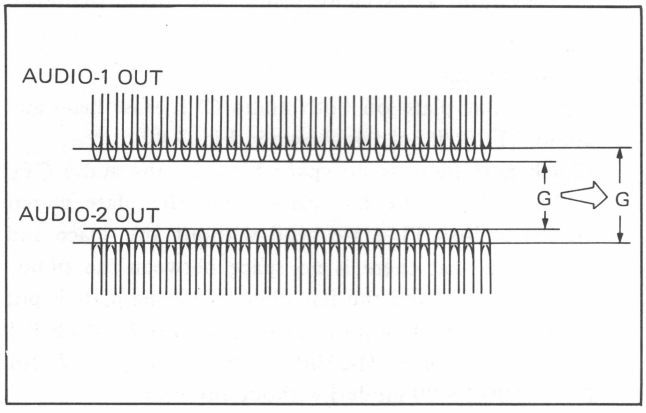
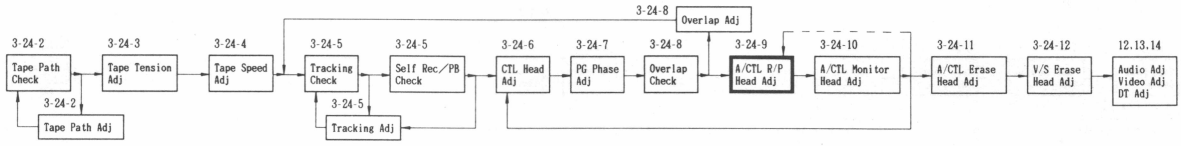


Fig. 3-92. Audio/CTL R/P Head Height Check



Adjustment

4. Loosen the height adjustment release screw 1/2 to 1 turn.
5. Turn the height adjustment screw as follows.
   a. If "G" becomes narrow when the tape is pushed down, turn the height adjustment screw clockwise.
   b. If "G" becomes narrow when the tape is pushed up, turn the height adjustment screw counterclockwise.
6. Tighten the height adjustment release screw and check the height again by performing Step 3.

   Note: The height adjustment release screw should be tightened with 14 to 16 kg·cm torque.

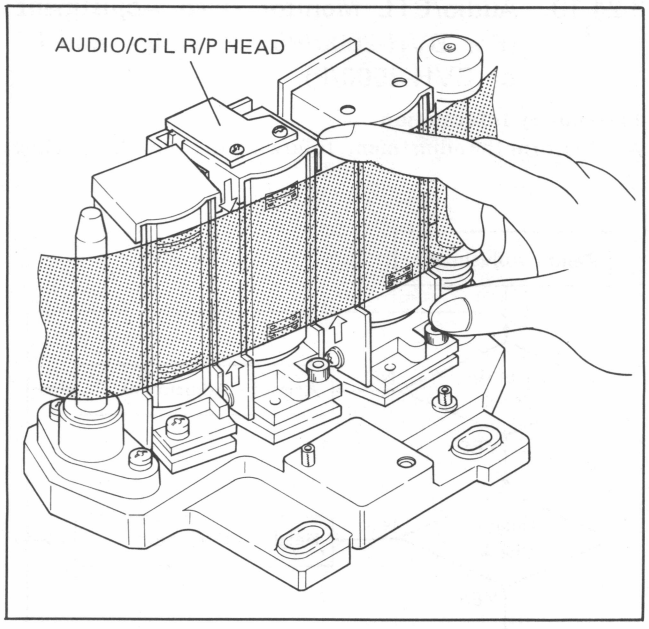


Fig. 3-93. Audio/CTL R/P Head Height Check

Fluctuation Adjustment

Check

1. Connect the oscilloscope to AUDIO-1 OUT.
2. Check that SKEW switch on RL-12 board is set to AUTO.
3. Play back the audio 15 kHz segment of the alignment tape, and adjust the scope so that the amplitude "A" becomes as wide as possible as shown in Fig. 3-94.
4. Set SKEW switch to MANU and turn SKEW knob full counterclockwise, and then suppose that the amplitude shown on the scope is "B".

   Check that the ratio of "A" to "B" is the specified value shown in Fig. 3-94. If the specified value is obtained, set SKEW switch to AUTO. If the specified value is not obtained, perform the following adjustment.

Adjustment

5. Check that the height adjustment screw is not being loose.
6. Loosen the height adjustment release screw 1/2 to 1 turn.
7. When the fluctuation adjustment screw is turned clockwise or counterclockwise a little and check whether the specified value shown in Fig. 3-94 is obtained. Repeat the adjustment and check procedures until the specified value is obtained.
8. Tighten the height adjustment release screw and check that the specified value is obtained by performing Step 4 again.

   Note: The height adjustment release screw should be tightened with 14 to 16 kg·cm torque.
9. Return to the beginning of the flowchart and check the azimuth and height.

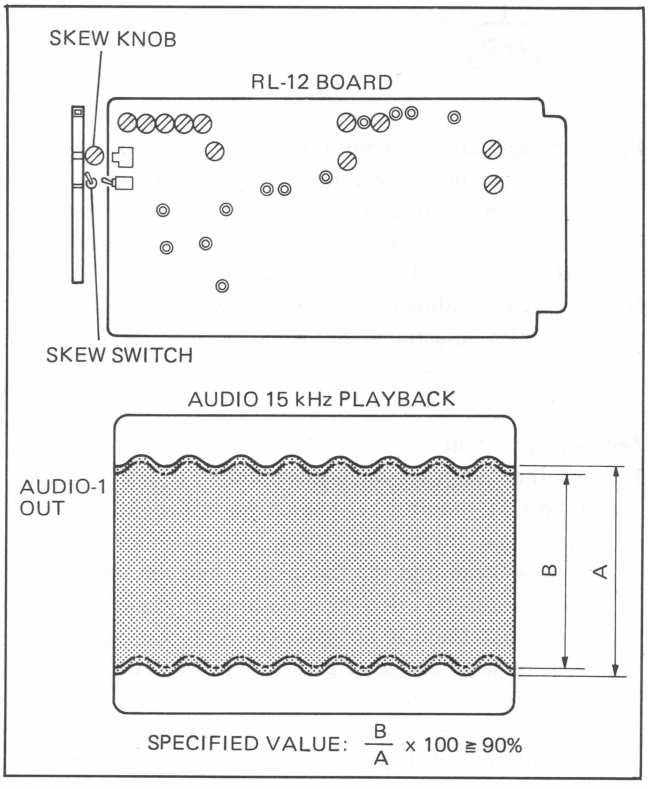
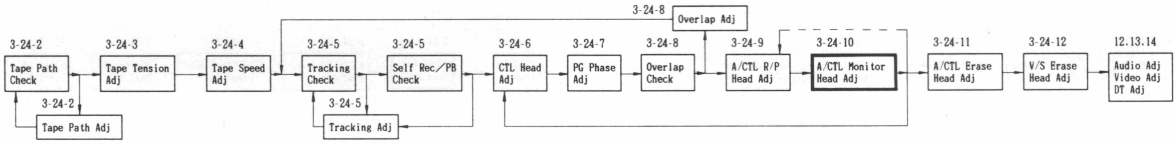


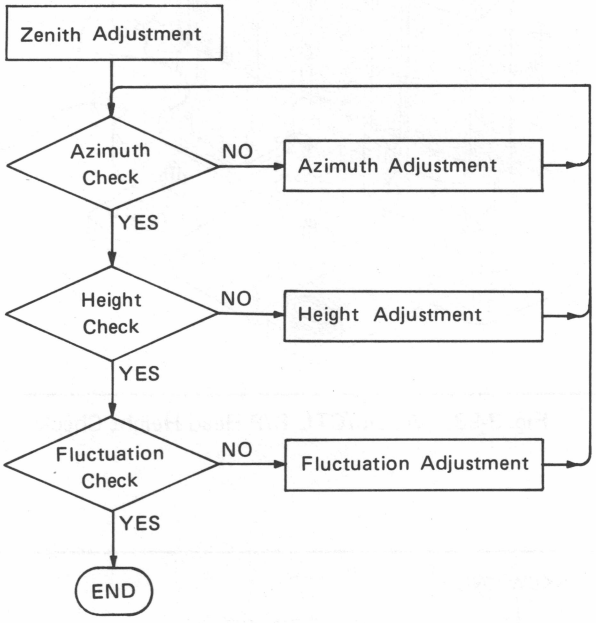
Fig. 3-94. Audio/CTL R/P Head Fluctuation Adjustment



3-24-10. Audio/CTL Monitor Head Adjustment (For BVH-2000/PS/PM 02/04 model or BVH-2500/P)

Preliminary Information

A. Perform the adjustment, following the flowchart below.



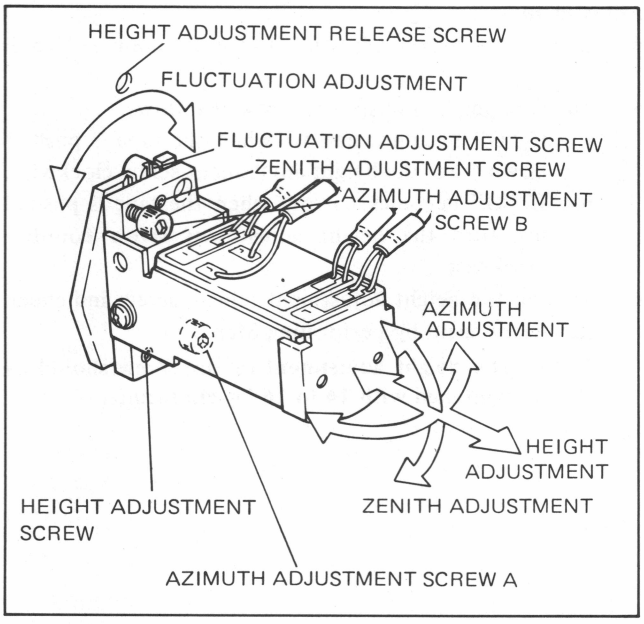
B. When the guides on the tape path have been adjusted, be sure to check the audio/CTL monitor head, following the above flowchart.

C. Prepare the following flat plate for zenith adjustment. Part No. J-6040-160-A

D. The zenith adjustment is not necessary except when the zenith adjustment screw has been made to turn or the azimuth adjustment screw has been tightened excessively.

Zenith Adjustment

1. Put the flat plate on both audio/CTL R/P head and audio/CTL monitor head as shown in Fig. 3-95.
   Check that there is no space between the audio/CTL monitor head and the flat plate when the plate is put on the audio/CTL R/P head without any space and also check that there is no space between the audio/CTL monitor head and that plate when the plate is put on the guide post 1 without any space.
2. If there is a space, equalize and minimize each space by turning the zenith adjustment screw of the audio/CTL monitor head.



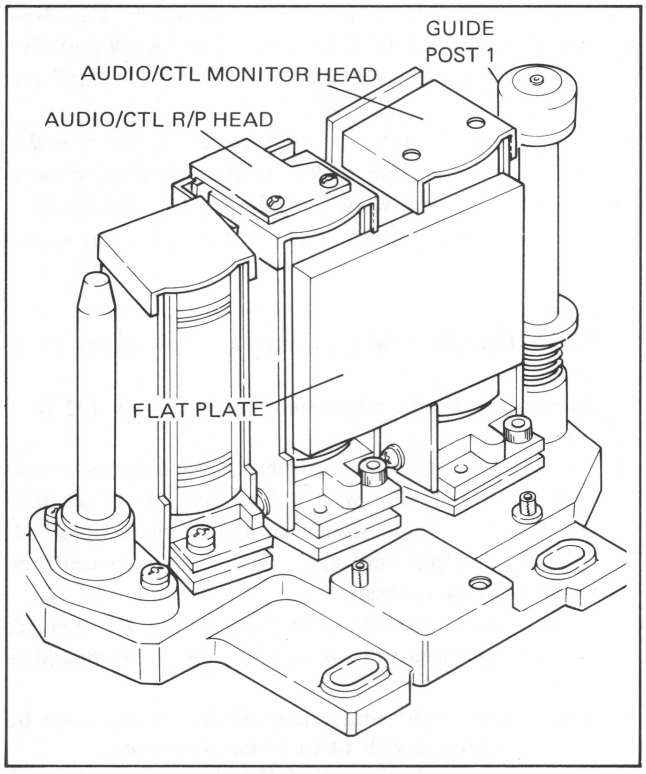
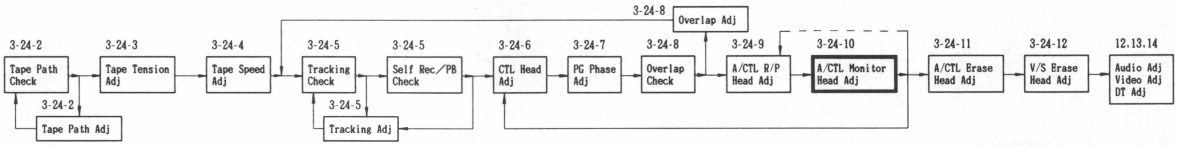


Fig. 3-95. Audio/CTL Monitor Head Zenith Adjustment



Azimuth Adjustment

Check

1. Set AUDIO MONITOR select button to [AUDIO-1 AUDIO-2], and short-circuit JP1 on LG board.
2. Connect the oscilloscope to MONITOR OUTPUT L and MONITOR OUTPUT R.
   Set the oscilloscope in the EXT. HORIZONTAL mode so that the Lissajous figures can be seen on the scope.
3. Play back the audio 3 kHz segment of the alignment tape and adjust by turning RV106 and RV206 on the AU-27 board so that AUDIO-1, 2 meters show 0 VU. Adjust the scope so that the amplitude of the audio-1 channel and the audio-2 channel is 6 cm.
4. Check that the phase difference between the audio-1 channel and the audio-2 channel is within 5 degrees. See Fig. 3-96.
   If the specified value is not obtained, perform the following adjustment.

Adjustment

5. Loosen the azimuth adjustment screw B and adjust by turning screw A so that the specified phase difference is obtained. Slightly turn screw B clockwise and then adjust by turning screw A so that the specified phase difference is obtained. Repeat the same procedure until both screws are tightened completely and finally check that the specified value is obtained.
   Note: The screws should be tightened with 6 to 8 kg•cm torque.
6. Play back the audio 15 kHz segment of the alignment tape and adjust the scope so that the amplitude of the audio-1 channel and the audio-2 channel is 6 cm.
7. Check that the phase difference between the audio-1 channel and the audio-2 channel is within 30 degrees. See Fig. 3-97.
   If the specified value is not obtained, repeat Step 5 again.

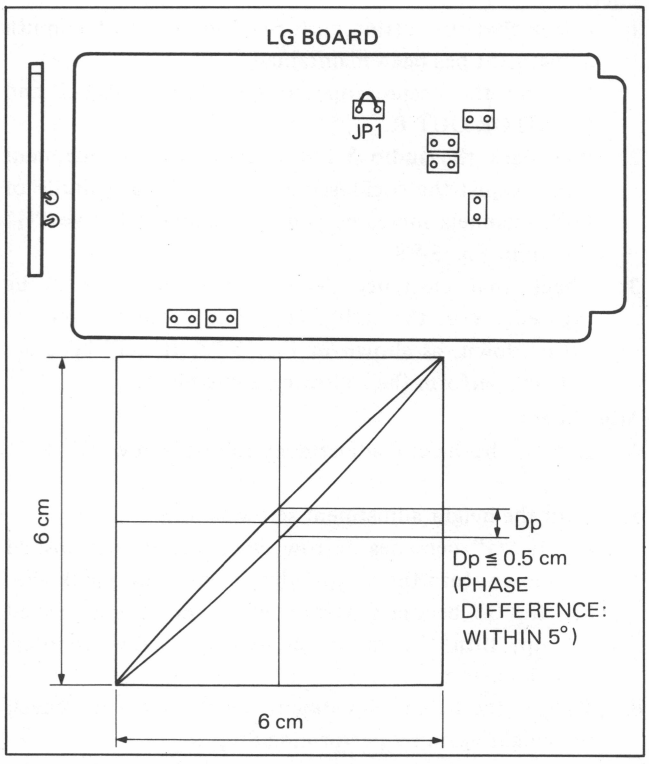


Fig. 3-96. Audio/CTL Monitor Head Azimuth Adjustment of Audio 3 kHz Playback

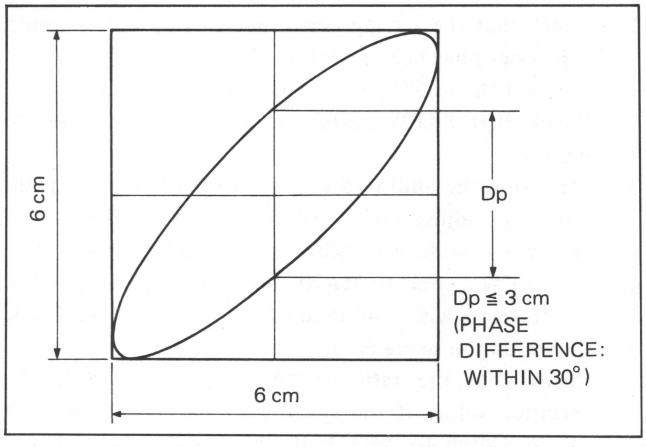
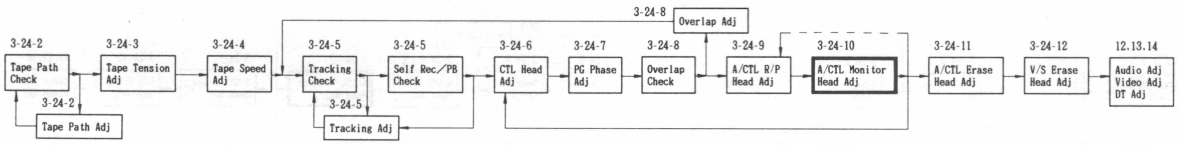


Fig. 3-97. Audio/CTL Monitor Head Azimuth Adjustment of Audio 15 kHz Playback



Height Adjustment

Check

1. Check that the setting performed in Step 1 of azimuth adjustment has been maintained.
   Connect the oscilloscope to MONITOR OUT L and MONITOR OUT R.
2. Play back the audio 3 kHz segment of the alignment tape. Adjust the oscilloscope so that the amplitude of both channels increases and it is equal. Observe "G" shown in Fig. 3-98.
3. Check that clearance "G" becomes wide when the tape edge near the audio/CTL monitor head is pushed up or down, as shown in Fig. 3-98. If "G" becomes narrow, perform the following adjustment.

Adjustment

4. Loosen the height adjustment release screw 1/2 to 1 turn.
5. Turn the height adjustment screw as follows.
   a. If "G" becomes narrow when the tape is pushed down, turn the height adjustment screw clockwise.
   b. If "G" becomes narrow when the tape is pushed up, turn the height adjustment screw counterclockwise.
6. Tighten the height adjustment release screw and check the height again by performing Step 3.
   Note: The height adjustment release screw should be tightened with 14 to 16 kg·cm torque.

Fluctuation Adjustment

Check

1. Check that the setting performed in step 1 of azimuth adjustment has been maintained.
   Connect the oscilloscope to MONITOR OUT L.
2. Check that SKEW switch on RL-12 board is set to AUTO.
3. Play back the audio 15 kHz segment of the alignment tape, and adjust the scope so that the amplitude "A" becomes as wide as possible. See Fig. 3-99.
4. Set SKEW switch to MANU and turn SKEW knob full counterclockwise, and then suppose that the amplitude shown on the scope is "B".
   Check that the ratio of "A" to "B" is within the specified value. If the specified value is obtained, set SKEW switch to AUTO. If the specified value is not obtained, perform the following adjustment.

Adjustment

5. Check that the height adjustment screw is not being loose.
6. Loosen the height adjustment release screw 1/2 to 1 turn.
7. Turn the fluctuation adjustment screw clockwise or counterclockwise a little and check that the specified value shown in Fig. 3-99 is obtained. Repeat the adjustment and check procedures until the specified value is obtained.
8. Tighten the height adjustment release screw and check that the specified value is obtained by performing Step 4 again.
   Note: The height adjustment release screw should be tightened with 14 to 16 kg·cm torque.
9. Return to the beginning of the flowchart and check the azimuth and height.
10. Remove the jumper connected in Step 1 of the azimuth adjustment.

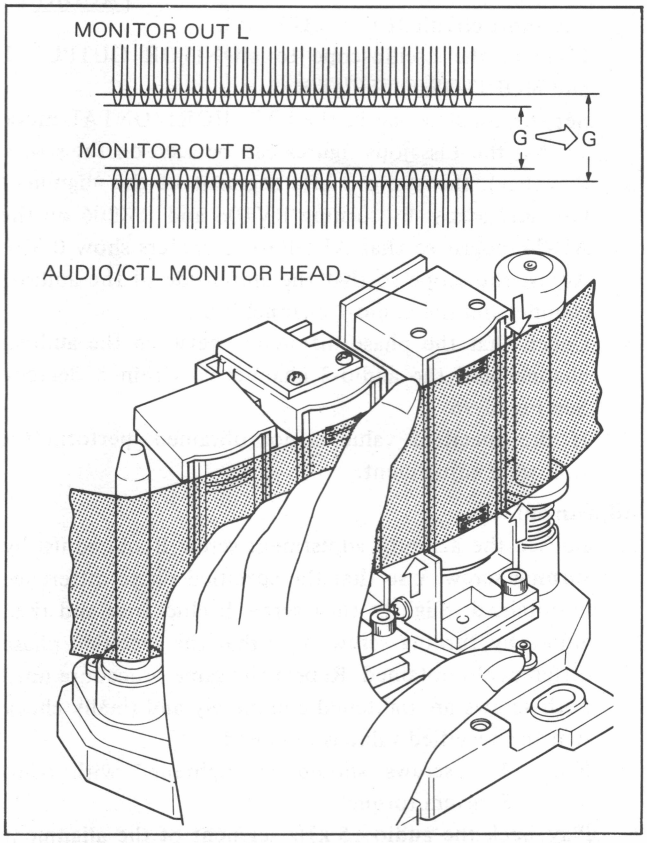


Fig. 3-98. Audio/CTL Monitor Head Height Check

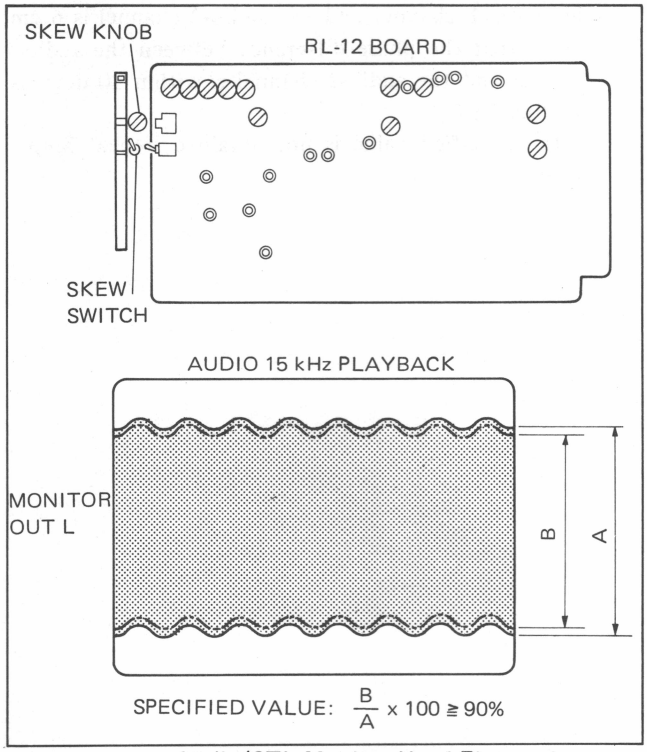
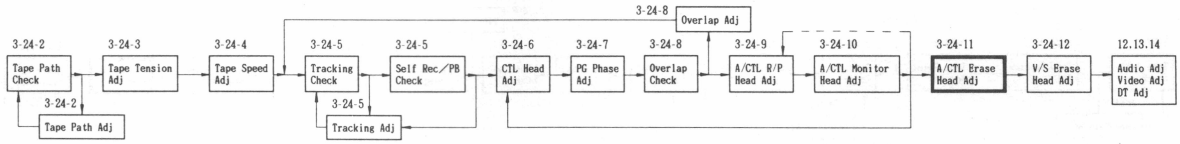


Fig. 3-99. Audio/CTL Monitor Head Fluctuation Adjustment



3-24-11. Audio/CTL Erase Head Height Adjustment

When the audio/CTL erase head is replaced or when the height adjustment of the guides has been performed after replacing the head drum assy, check the height of the audio/CTL erase head.

Check

1. Set AUDIO MONITOR select button to AUDIO-1 AUDIO-2.
2. Record 1 kHz signal on the audio-1 and audio-2 channels.
3. Rewind the segment recorded in Step 2 and record no signal on the audio-1 and audio-2 channels.
4. Connect the headphones and play back the segment of no signal recorded in Step 3.
   Check that 1 kHz signal is not heard even if MONITOR/PHONES level control is set to maximum. If the signal is heard, adjust as follows.

Adjustment

5. Loosen the adjustment release screw 1/2 to 1 turn.
6. Change the head height by turning the height adjustment screw a little. After tightening the adjustment release screw, check the height of the head by performing Steps 2 to 4 again.

   Note: The adjustment release screw should be tightened with 14 to 16 kg·cm torque.

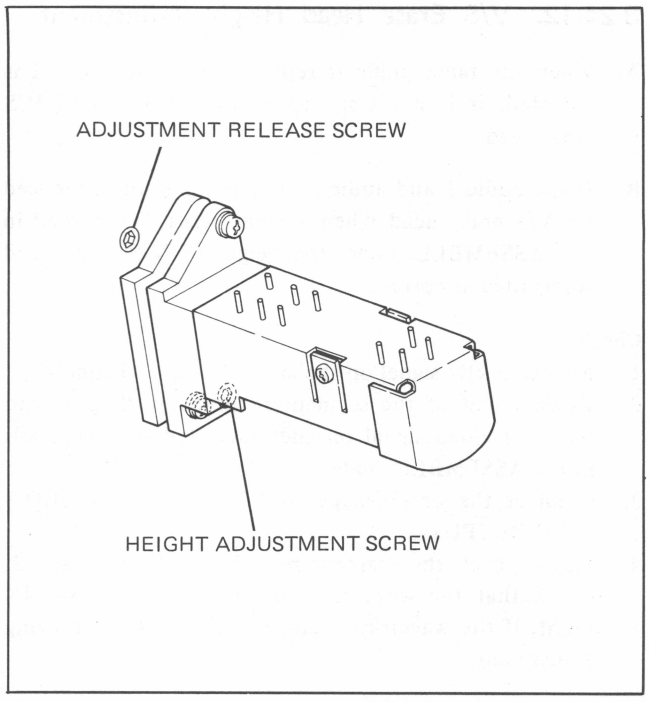
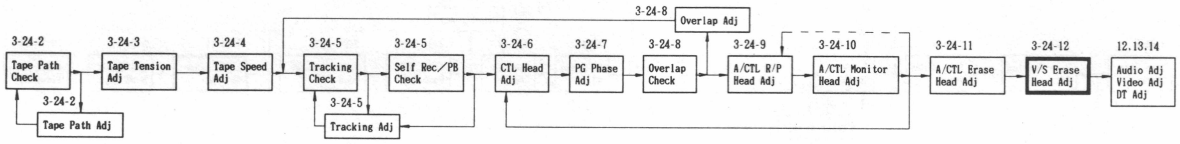


Fig. 3-100. Audio/CTL Erase Head Height Adjustment



3-24-12. V/S Erase Head Height Adjustment

A. When the taper guide is replaced or guide roller 2 is adjusted, it is necessary to adjust the height of V/S erase head.

B. If the audio-1 and audio-3 channels are not influenced by V/S erase head when a video signal is recorded in the ASSEMBLE mode, the height of V/S erase head is regarded as correct.

Check

1. Record 3 kHz signal on the audio-1 and -3 channels.
2. Rewind half of the segment recorded in Step 1, and record a video signal on the video and sync channels in the ASSEMBLE mode.
3. Connect the oscilloscope to AUDIO-1 and AUDIO-3 LINE OUTPUTs.
4. Playing back the segment recorded in Steps 1 and 2, check that the waveform does not change at the IN point. If the waveform changes, perform the following adjustment.

Adjustment

5. Take off V/S erase head assy by removing V/S screw.
6. Change the thickness of the spacer.

   a. If the audio-1 waveform changes, decrease the thickness of the spacer.
   b. If the audio-3 waveform changes, increase the thickness of the spacer.

Thickness (mm)	Part No.
0.05	3-651-419-01
0.1	3-651-419-21

7. Mount V/S erase head assy referring to Fig. 3-101, and check the height of V/S erase head by performing Steps 1 to 4 again.

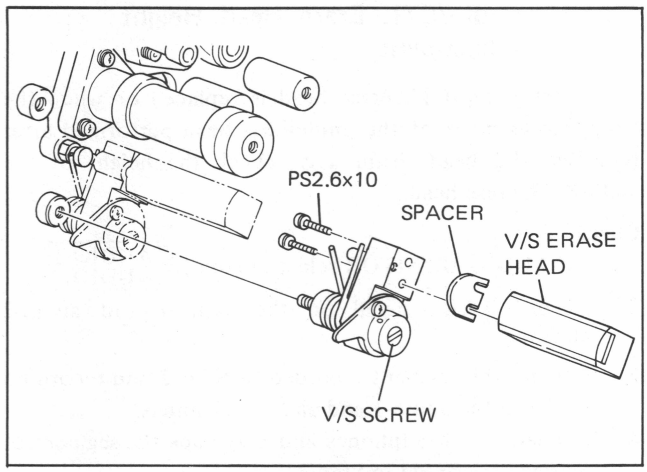


Fig. 3-101. V/S Erase Head Height Adjustment

SECTION 4
SERVICE INFORMATION

4-1. PRINCIPAL COMPONENTS LOCATION

TAPE TRANSPORT: HEAD, MOTOR, SOLENOID etc.

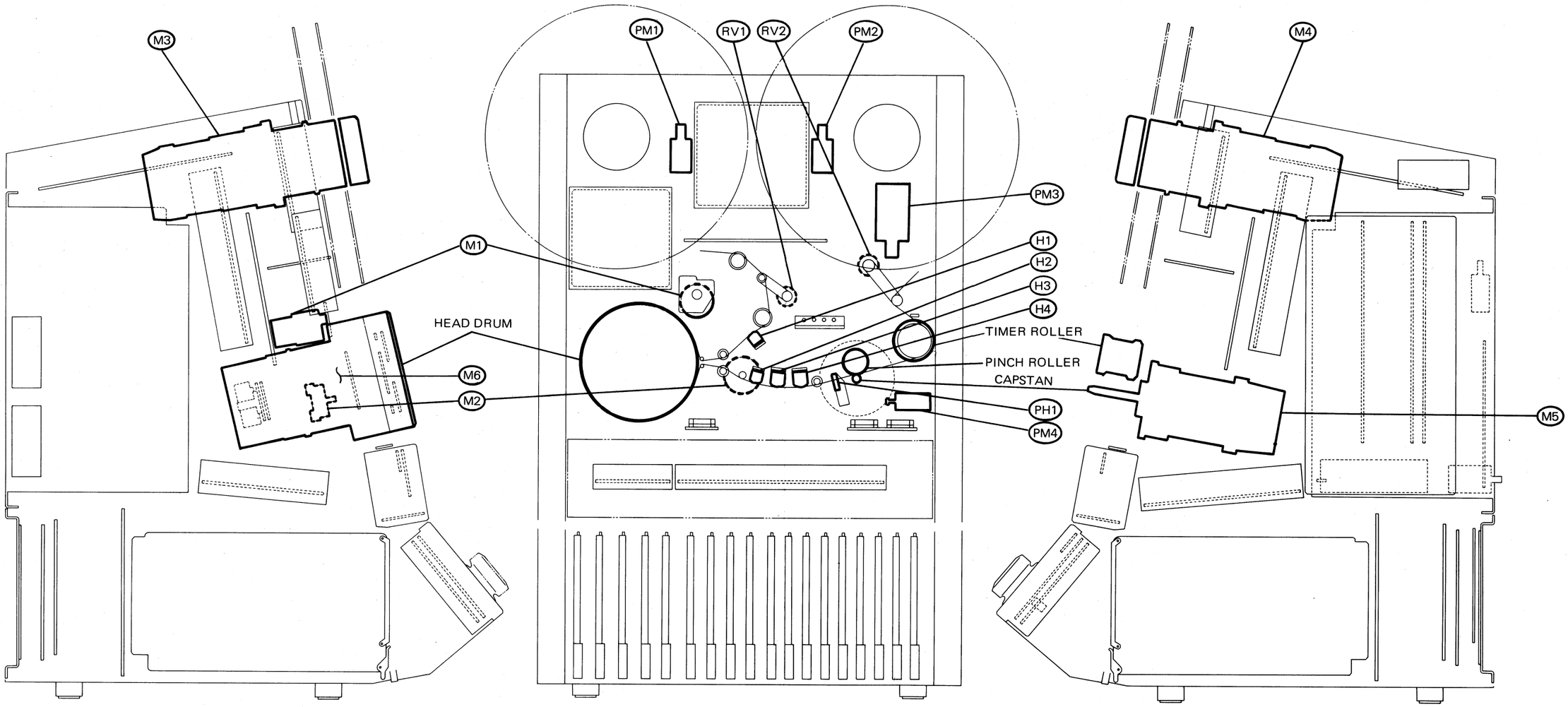
H1 HEAD, V/S ERASE
H2 HEAD, AUDIO/CTL ERASE
H3 HEAD, AUDIO/CTL R/P
H4 HEAD, AUDIO/CTL MONITOR: BVH-2000 02 model
BVH-2500

M1 MOTOR, THREADING
M2 MOTOR, IP (IMPEDANCE ROLLER)
M3 MOTOR, SUPPLY REEL
M4 MOTOR, TAKE-UP REEL
M5 MOTOR, CAPSTAN
M6 MOTOR, DRUM

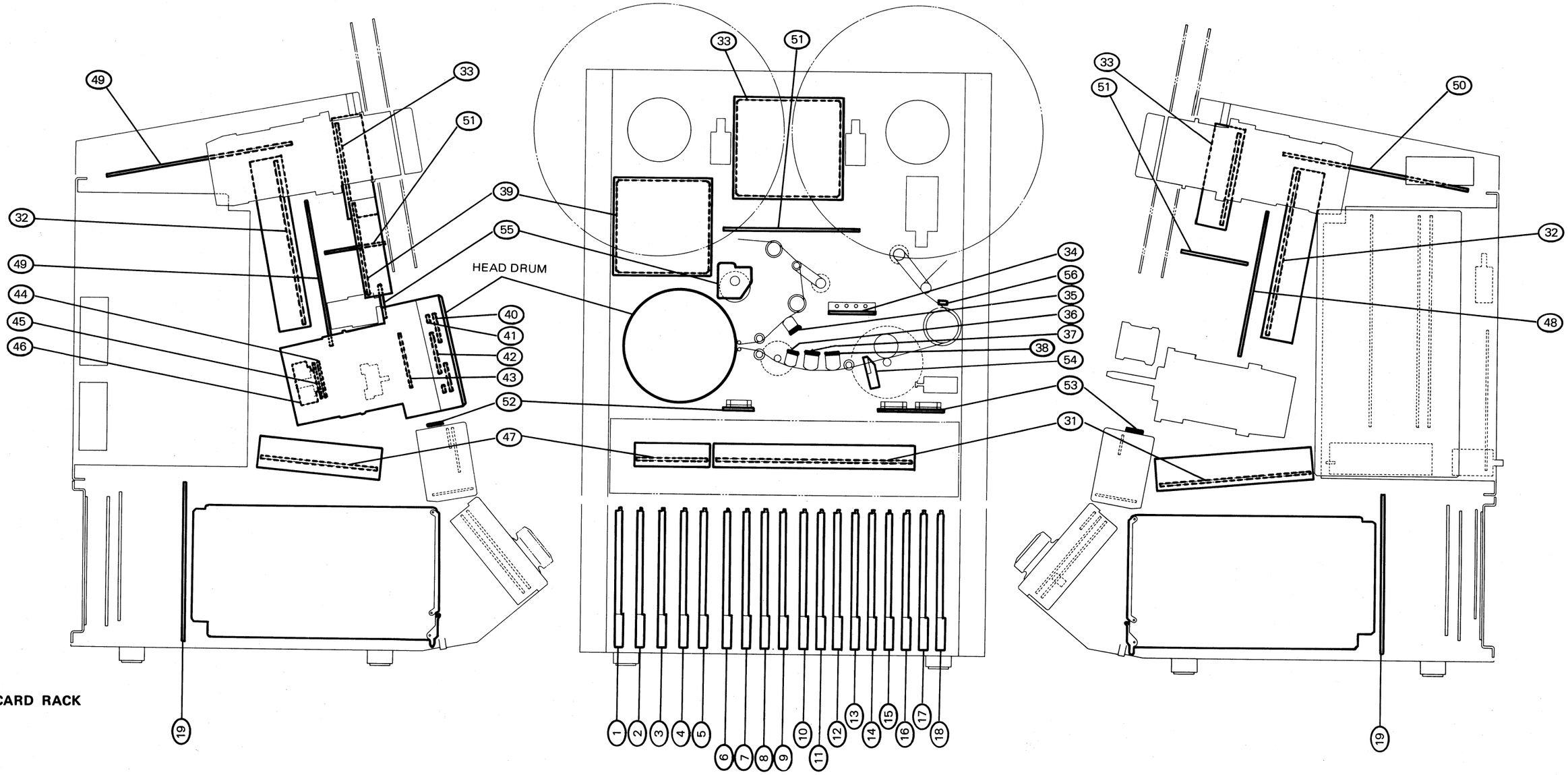
PH1 PHOTOINTERRUPTER, TAPE SENSOR

PM1 SOLENOID, SUPPLY REEL BRAKE
PM2 SOLENOID, TAKE-UP REEL BRAKE
PM3 SOLENOID, PINCH ROLLER
PM4 SOLENOID, MINI TENSION ARM: BVH-2000 02 model
BVH-2500

RV1 POTENTIOMETER, SUPPLY TENSION
RV2 POTENTIOMETER, TAKE-UP TENSION



TAPE TRANSPORT: PRINTED CIRCUIT BOARD



CARD RACK

TAPE TRANSPORT: PRINTED CIRCUIT BOARD

31 AP-06 BOARD: AUDIO/CTL REC/PB PREAMPLIFIER
32 BE-02 BOARD: AUDIO BIAS/ERASE OSCILLATOR
33 BE-03 BOARD: AUDIO BIAS AMPLIFIER
34 BE-04 BOARD: AUDIO BIAS LEVEL ADJ.

35 HD-06 BOARD: V/S ERASE HEAD
36 CEH-2 BOARD: AUDIO/CTL ERASE HEAD
37 HD-07 BOARD: AUDIO/CTL R/P HEAD
38 HD-07 BOARD: AUDIO/CTL MONITOR HEAD

39 RP-09 BOARD: VIDEO/SYNC R/P AMP (for R/P HEAD)

40 DR-22 BOARD: VIDEO/SYNC PB AMP (for CONFI HEAD)
41 DR-23 BOARD:
42 DR-15 BOARD: } ROTARY HEAD RELAYING
43 DR-16 BOARD:
44 SL-07 BOARD:
45 SL-08 BOARD: } SLIP RING RELAYING
46 SL-09 BOARD:

47 DD-01 BOARD: DT DRIVER
48 CA-09 BOARD: CAPSTAN MOTOR DRIVER
49 DA-07 BOARD: DRUM MOTOR DRIVER
50 RA-05 BOARD: REEL MOTOR DRIVER

51 TT-01 BOARD: TTP AUX
(SOLENOID, MOTOR DRIVER etc.)
52 HM-05 BOARD: HEAD HOURS METER
53 TM-16 BOARD: TAPE RUNNING/OPERATION-HOURS METER
54 TD-05 BOARD: TAPE DETECTOR
55 TH-03 BOARD: THREADING MOTOR
56 TR-07 BOARD: TIMER ROLLER SENSOR

CARD RACK

1 AU-27 BOARD: AUDIO-1, 2 REC EQ/PB AMPLIFIER
2 AE-03 BOARD: AUDIO-3 REC EQ/PB AMPLIFIER
3 EQ-02 BOARD: VIDEO/SYNC PB EQUALIZER
4 DM-25 BOARD: VIDEO DEMODULATOR
5 MD-22 BOARD: VIDEO MODULATOR
6 DV-01 BOARD: Δ VIDEO
7 LM-10 BOARD: LINE MEMORY
8 VP-15 BOARD: VIDEO PROCESSOR
9 TD-17 BOARD: TRACK DRIVE
10 LG-04 BOARD: LOGIC
11 TC-14/A BOARD: TIME CODE READER/GENERATOR
12 SY-79 BOARD: SYSTEM CONTROL CPU-1
13 SY-80 BOARD: SYSTEM CONTROL CPU-2
14 SV-43 BOARD: SERVO CPU
15 RL-12 BOARD: REEL SERVO
16 CD-17 BOARD: CAPSTAN/DRUM SERVO
17 SR-15 BOARD: SERVO REF. SIGNAL GENERATOR
18 DT-04 BOARD: DT CONTROL: FOR BVH-2500(U/C)
DT-05 BOARD: DT CONTROL: FOR BVH-2500P
19 MB-60 BOARD: MOTHER BOARD

4-3. NOTES ON POWER UNIT

4-3-1. Capacity of AC Power Source

The AC (50/60 Hz) power supply voltage of the BVH-2000/2500 is 90 to 132V and the power consumption is 550W max.

However, in the worst case, approx. 10A input current may flow and the surge currents will be three or four times as much. If the capacity of the power source is inadequate, the circuit breaker may operate unexpectedly or the internal protector of the BVH-2000/2500 may operate so as not to output a DC voltage.

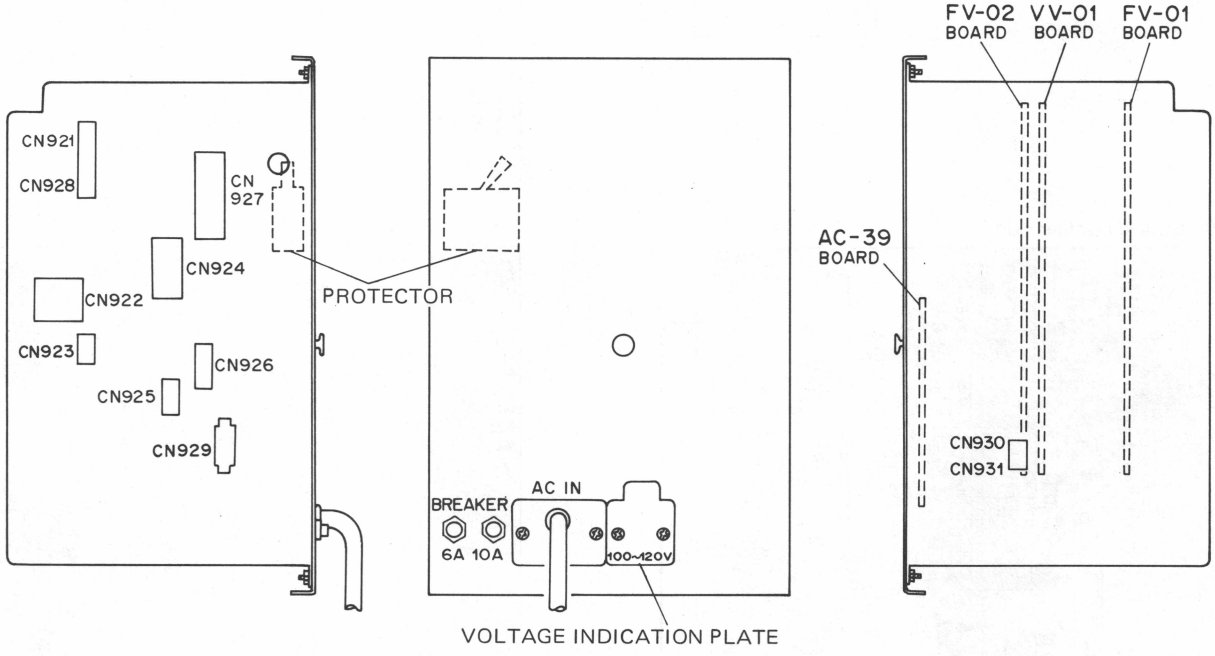
4-3-2. Voltage Indication Plate

The voltage indication plate should be left attached to the rear panel of the power unit. To attach the plate sets the power unit to operate with the voltage range between 90–132V AC.

4-3-3. Ventilation/Heat Sink

The four fans are for cooling the BVH-2000/2500. If either the intake or exhaust should become clogged or the fans stop, damage may result to the power unit etc.

The heat sinks provided on each board are rated on the assumption that cooling will be provided by the fans. Consequently, the unit should not be operated too long without fan cooling (such as when the unit is opened for checks etc.).



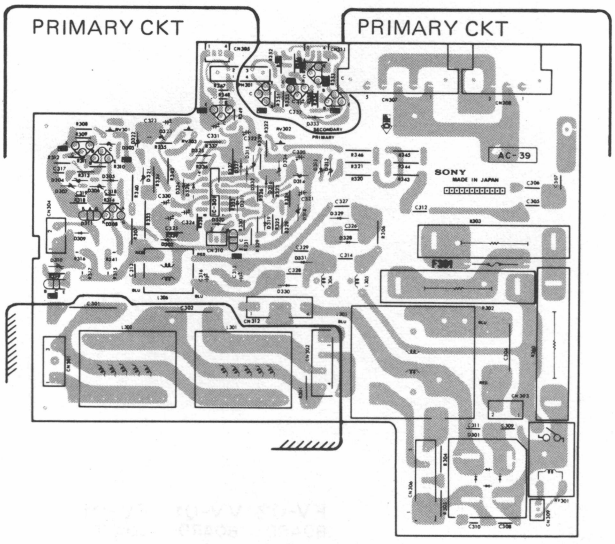
4-3-4. Primary Circuit & Electric Shock

The BVH-2000/2500 power supply comprises a switching regulator and the PS-14 series regulator board; the switching regulator comprises the AC-39, FV-02, VV-01 and FV-01 boards and the primary circuit associated parts. The entire switching regulator is mounted on the same chassis as the power unit.

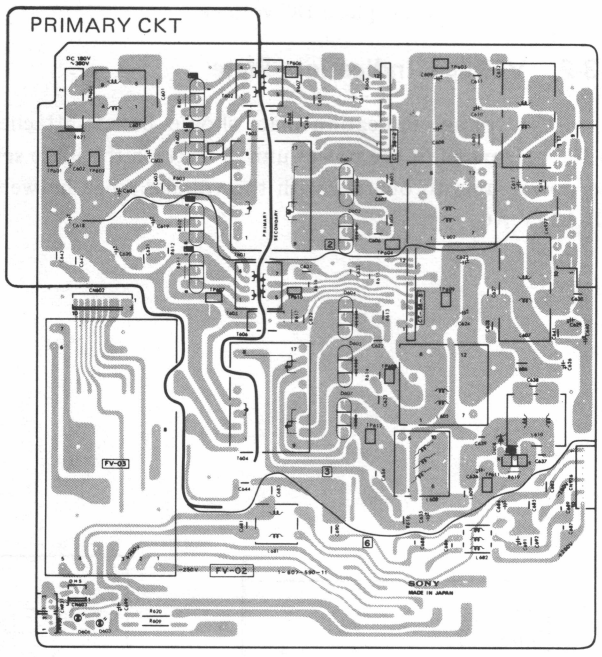
Since the switching regulator is mainly on the primary side, it is important to beware of electric shock. The figure below shows the primary side of each board. The heat sinks on the primary zone of the FV-02, VV-01 and FV-01 are also connected to the primary.

Note that the parts indicated by diagonal bars on the AC-39 board are active even when the power switch is off.

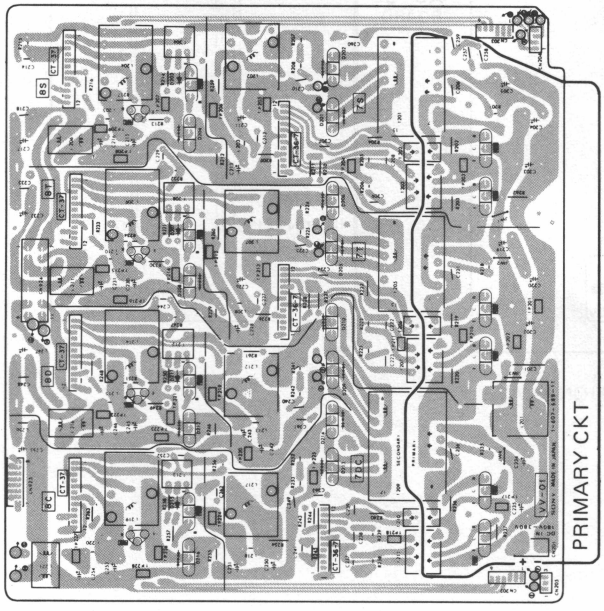
AC-39 BOARD (solder side)



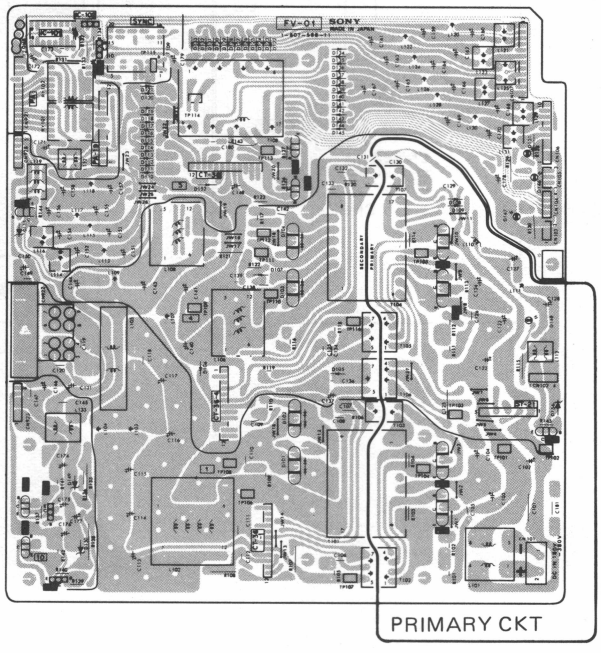
FV-02 BOARD (solder side)



VV-01 BOARD (solder side)



FV-01 BOARD (solder side)



Note that even after the power switch is turned off, a high voltage remains in the two electrolytic capacitors in the power unit and it is dangerous to discharge them rapidly.

On the FV-02, VV-01 and FV-01 boards, even after disconnecting the CN601, 201 and 101 input connectors, a high voltage still remains in the following capacitors:

FV-02 board (CN601)	VV-01 board (CN201)	FV-01 board (CN101)
C602	C202	C102
C603	C203	C103
C604	C204	C104
C618	C205	C122
C620	C219	C123
	C220	C124
	C234	
	C235	

CN924 on the VV-01 board (connected to CN104/CA-09 board and CN208/RA-05 board) and CN926 on the FV-02 board (connected to CN281/DD-01 board) both output high voltages. Beware of electric shock!

4-3-5. Check of AC-39 Board

The checking the AC-39 board, note the following:

1) It is easier to perform the check after removing the ornamental panel of the power unit (remove the nuts using a nut driver).
2) Most of the AC-39 board is on the primary side and the AC-39 board has a live section even after the power switch is turned off. Beware of electric shock!
3) The heat sink of rectifier diode D31 on the AC-39 board is secured on the power unit chassis with a screw which improves the radiation effect. Do not operate too long with the screw removed from the chassis.
4) As the main rectifier circuit, sub rectifier circuit and secondary circuits all have different potentials, do not use the same "cold (GND)" for all of them.
5) The CN303 and CN304 2-pin connectors are necessary for the operation of the protector circuit and should be left connected when servicing or checking.
6) Do not load with the CN305 4-pin connector and CN309 and CN310 3-pin connectors disconnected.

4-3-6. LEDs for DC Output Check

Green LEDs are provided on the FV-02 and FV-01 boards for the following output checks:

FV-02 board
D603: +13.8V (for +12V)
D606: −13.8V (for −12V)

FV-01 board
D146: +6.8V (for +5V)
D147: +13V (for the fans)
D148: +13V (for primary ckt CTL)
D151: +17V (for secondary ckt CTL)

4-3-7. DC Output Terminals

The cold side (GND pins) of the switching regulator DC output circuit is divided according to the voltage system and each output voltage is determined by an each GND pin.

Output system	Respective pin HOT-COLD (GND)
FIXED OUTPUTS	
+6.8V (for +5V)	CN922, 1-6
−8.6V (for −5V)	CN927, 9-17
+13.8V (for +12V)	CN927, 5-7
−13.8V (for −12V)	CN927, 4-10
+19V (for +12V pre-drive)	CN928, 1-3
−19V (for −12V pre-drive)	CN928, 5-3
+250V (for DT)	CN926, 10-8
−250V (for DT)	CN926, 6-8
+13V (for solenoids)	CN923, 1-3
+13V (for fans)	CN930, 1-3
−48V (for fluorescent display)	CN926, 1-3
VARIABLE OUTPUTS	
SR VH (for S-reel motor)	CN924, 1-7
TR VH (for T-reel motor)	CN924, 2-8
DR VH (for drum motor)	CN924, 5-10
CP VH (for capstan motor)	CN924, 6-11

4-3-8. PDS (Power Dead Sense) Function

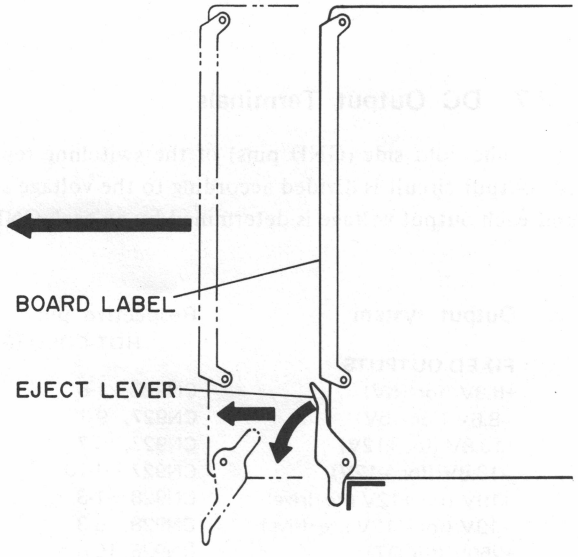
If a malfunction occurs in one of the switching regulator outputs +/−19V, +/−13.8V, +6.8V and −8.6V, all the outputs will be interrupted. This function is designated as PDS (Power Dead Sense).

The PDS will not operate, even though a malfunction occurs in the variable outputs (SR VH, TR VH, DR VH, CP VH), or DT drive (+/−250V), fluorescent display drive (−48V) and fan/solenoid drive (+13V) in the fixed outputs.

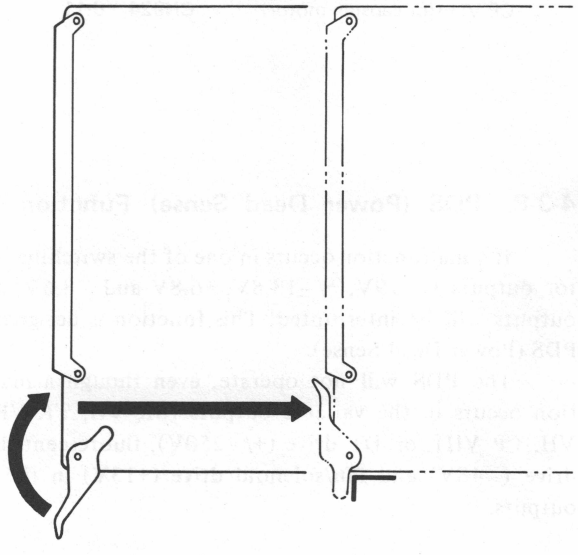
4-4. EXTRACTING/INSERTING PLUG-IN BOARDS

Wait two seconds or more after switching off the power before extracting or inserting any of the plug-in boards.

Extract the board from the connector using the eject lever. Do not start by pulling on the board label.



Set the eject lever in the position shown and then insert the board.



4-5. NOTES ON REPAIR PARTS

(1) Safety Related Components Warning

Components identified by shading marked with ⚠ on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

(2) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts".

This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

(3) Change of Parts

Regarding engineering parts changes, refer to Section E. "CHANGED PARTS".

(4) Stock of Parts

Parts marked with ( ) on the spare parts list are not normally required for routine service work. Orders for parts marked with ( ) will be processed, but allow for additional delivery time.

(5) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified:

Capacitors; μF
Inductors; μH
Resistors; ohm

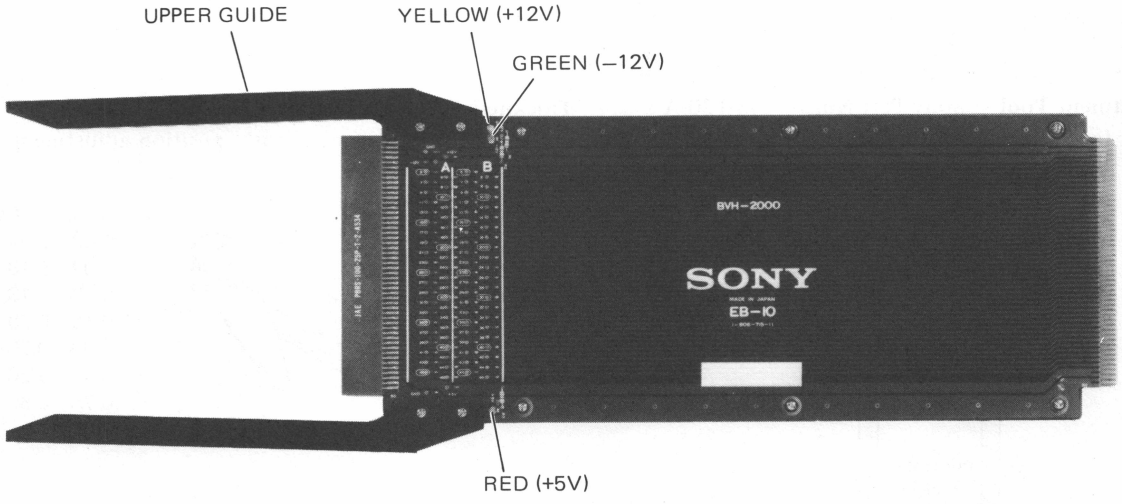
4-6. MAINTENANCE TOOLS/FIXTURES

Extender, EB-10 Sony Part No. A-6001-005-A

Used for checking and repairing the plug-in circuit board in the card rack. BVH-2000/2500 series VTR has 1 pc as an accessory.

If the EB-10 extender is inserted into the card rack, it is possible to check that +12V, −12V and +5V DC is being supplied by checking the illumination of the LEDs on the extender.

When the VTR is mounted in a 19" rack, remove the upper guide on the extender for use.

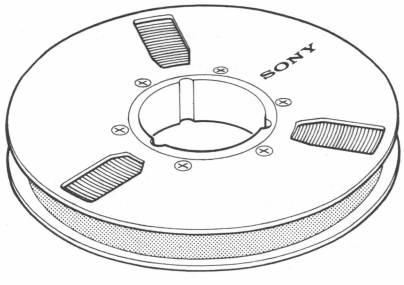


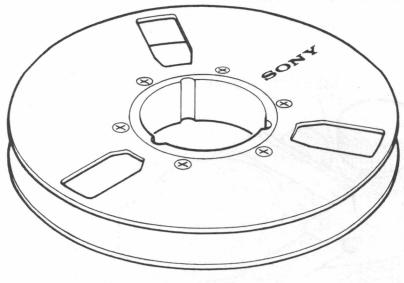
Alignment Tape, BR5-2NTSC Sony Part No. 8-944-005-03

An alignment tape for the BVH series NTSC VTR. The contents are shown on the section 4-7.

Empty Reel

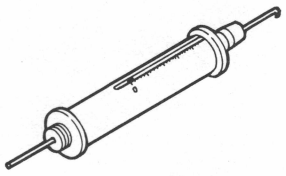
Used for reel brake torque adjustment. An ordinary empty reel can be used. However, when the VTR is mounted in a console, remove the top flange from the empty reel because the space around the reels is not enough to measure with a tension scale.





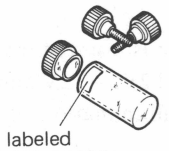
Tension Scale, 5 k grams Sony Part No. J-6041-640-A

The 5 k grams tension scale is used for pinch roller pressure adjustment.



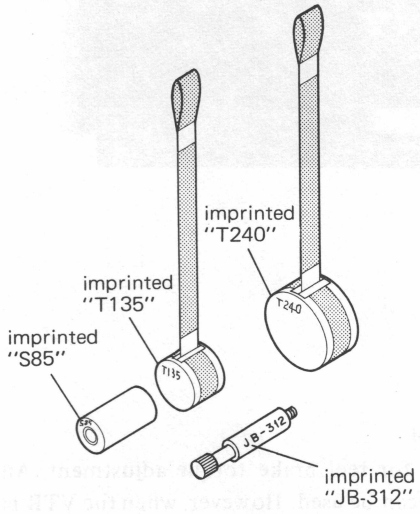
Tapered Screw Sony Part No. J-6040-460-A

Consists of two tapered screws and used for upper drum position adjustment.



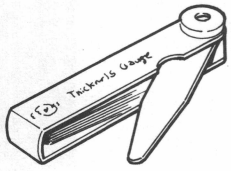
Tension Adjustment Tool Sony Part No. J-6043-120-A

Used for tape tension adjustment.



Thickness Gauge Sony Part No. J-6041-670-A

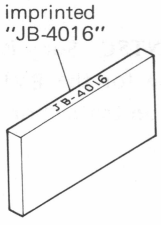
Used for mechanical parts position adjustment.



thickness (mm)		
0.03	0.04	0.08
0.09	0.10	0.11
0.12	0.13	0.14
0.15	0.20	0.25
0.30	0.35	0.40
0.45	0.50	0.60
0.75	0.80	0.90
1.00		

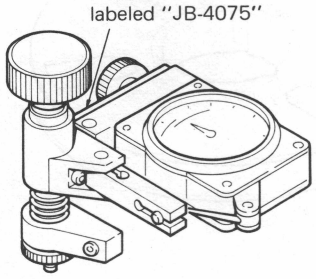
Flat Plate Sony Part No. J-6040-160-A

Used for stationary head zenith check and adjustment.



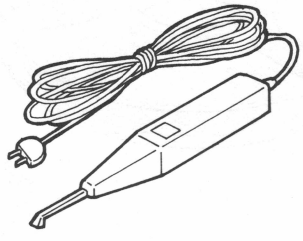
Drum Eccentricity Adj. Gauge Sony Part No. J-6040-750-B

Used for drum eccentricity adjustment and for rotary head tip projection check.



Demagnetizer, Sony HE-4 Commercially Available

Used to demagnetize heads.

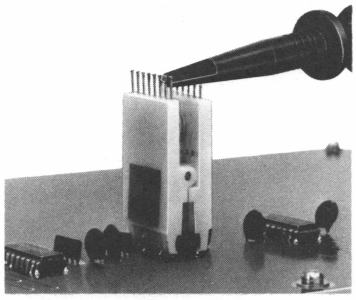


IC Test Clip, TC-16 Sony Part No. J-6041-770-A
IC Test Clip, TC-20 Sony Part No. J-6041-780-A

Manufactured by:

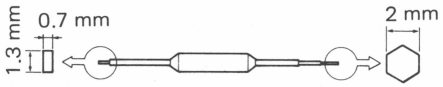
AP PRODUCTS INCORPORATED
P.O.Box 697, 72 Corwin Drive,
Painesville, Ohio 44077, U.S.A.
Phone: (216) 354-2101

When connecting the test probe to the terminal of DIP integrated circuit, these clips are convenient. Type TC-16 is for DIP 14-pin or 16-pin IC and Type TC-20 is for 18-pin or 20-pin IC.



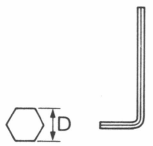
Alignment Screwdriver Sony Part No. 7-700-733-01

Used to adjust variable resistors and variable inductors etc.



L-shaped Hexagonal Wrench Set

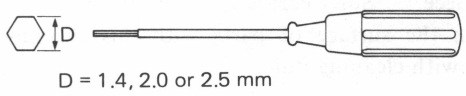
Sony Part No. 7-700-736-00
or J-6041-700-A



D (mm)	7-700-736-00	J-6041-700-A
1.27	○	
1.4	○	
1.5	○	○
1.58	○	
2.0	○	○
2.5	○	○
3.0	○	○
4.0	○	○
5.0	○	
6.0	○	
8.0	○	
10	○	

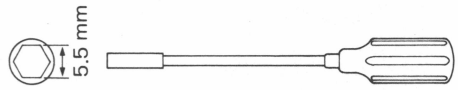
Hexagonal Screw Driver, 1.4 mm
Sony Part No. 7-700-766-02
Hexagonal Screw Driver, 2 mm
Sony Part No. 7-700-766-03
Hexagonal Screw Driver, 2.5 mm
Sony Part No. 7-700-766-04

Used for stationary head replacement.



Nut Driver, 5.5 mm Sony Part No. 7-700-751-02

Used to open the ornamental panel of the power unit for checking and repairing AC-39 board.

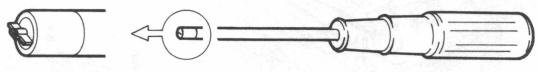


TOTSU Screwdriver 2 mm Sony Part No. 7-721-050-61
TOTSU Screwdriver 2.6 mm Sony Part No. 7-721-050-62
TOTSU Screwdriver 3 mm Sony Part No. 7-721-050-63
TOTSU Screwdriver 4 mm Sony Part No. 7-721-050-64

Screwdriver for "TOTSU" type screws shown below. Almost all the screws that are used in this machine are TOTSU type.

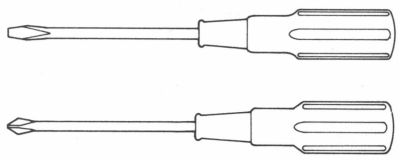
A flat blade screwdriver can be used for TOTSU screw but TOTSU screwdriver has the following merits.

- TOTSU screwdriver can catch a TOTSU screw. It is convenient when mounting or removing the TOTSU screw which is out of reach.
- The pin on the blade head prevents slipping off a TOTSU screw head.



Flat Blade Screwdriver
Phillips Screwdriver

These screwdrivers also are necessary for servicing.

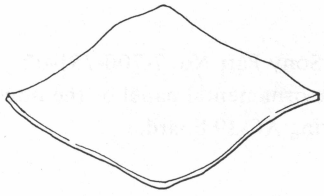


Cleaning Fluid

"FREON 113" is recommended for cleaning. When it is not available, methanol (Sony cleaning fluid, part number Y-2031-001-0) can be used for cleaning the surfaces of the components on the tape path. To clean the slip ring, use "FREON 113" or rub it with dry cloth.

Cleaning Piece Sony Part No. 2-034-697-00

Clean the surface of parts with this cleaning piece moistened with cleaning fluid.



Erase Head Spacer "B"

Thickness 0.05 mm Sony Part No. 3-651-419-01
Thickness 0.1 mm Sony Part No. 3-651-419-21

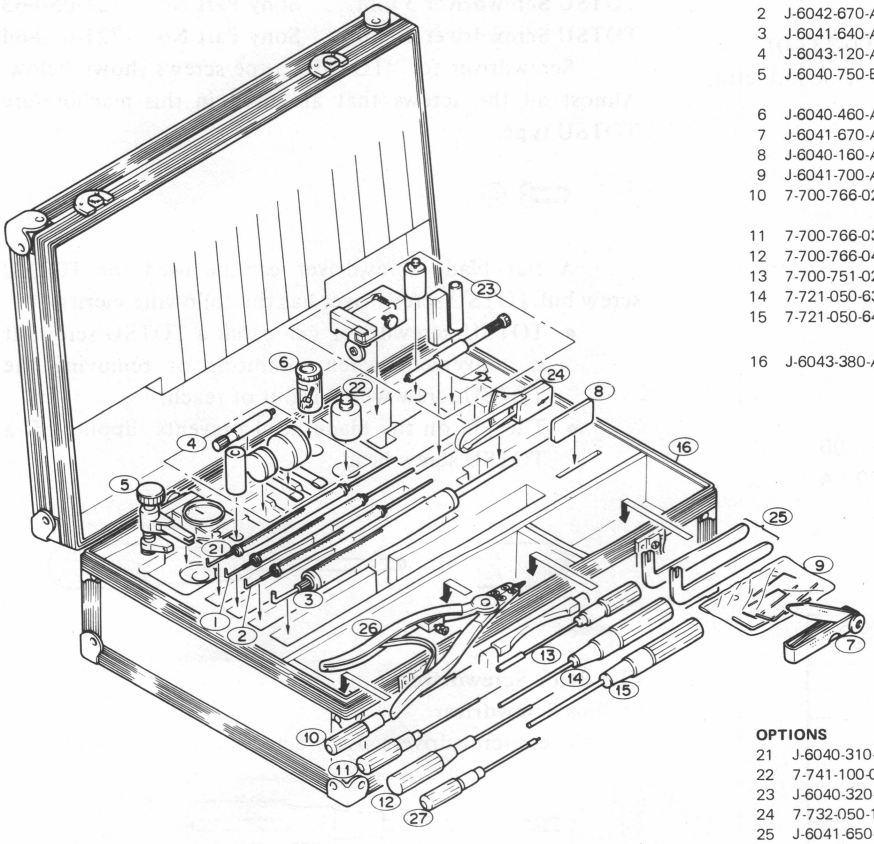
These may be necessary for the height adjustment of V/S erase head when replacing it.

Timer Roller Spacer

Thickness 0.02 mm Sony Part No. 3-651-334-01
Thickness 0.05 mm Sony Part No. 3-651-334-11
Thickness 0.1 mm Sony Part No. 3-651-334-21

These may be necessary for the slant adjustment of the timer roller when replacing it and when adjusting tape path.

BVH-2000 TOOL KIT Sony Part No. J-6043-230-A

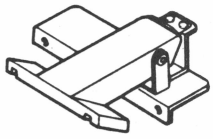


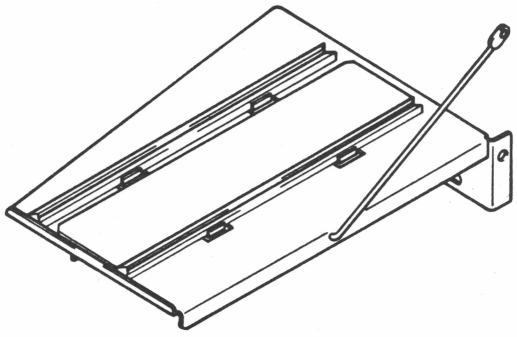
			USED FOR BVH-2000 2180 2500	BVH-1180 1100A	BVH-1000A 1100	BVH-500 500A
INCLUDED						
1	J-6041-630-A	Tension Scale, 200 grams	–	o	o	o
2	J-6042-670-A	Tension Scale, 1 kgrams	–	o	–	–
3	J-6041-640-A	Tension Scale, 5 kgrams	o	o	o	o
4	J-6043-120-A	Tension Adjustment Tool	o	–	–	–
5	J-6040-750-B	Drum Eccentricity Adj. Gauge	o	o	o	o
6	J-6040-460-A	Tapered Screws	o	o	o	o
7	J-6041-670-A	Thickness Gauge	o	o	o	o
8	J-6040-160-A	Flat Plate	o	o	o	o
9	J-6041-700-A	L-shaped Hex. Wrench Set	o	o	o	o
10	7-700-766-02	Hex. Screw Driver, 1.4 mm	o	–	–	–
11	7-700-766-03	Hex. Screw Driver, 2 mm	o	–	–	–
12	7-700-766-04	Hex. Screw Driver, 2.5 mm	o	–	–	–
13	7-700-751-02	Nut Driver, 5.5 mm	o	–	–	–
14	7-721-050-63	TOTSU Screw Driver, 3 mm	o	o	o	o
15	7-721-050-64	TOTSU Screw Driver, 4 mm	o	o	o	o
16	J-6043-380-A	Carrying Case	o			
OPTIONS						
21	J-6040-310-A	Tension Scale, 500 grams	–	o	o	–
22	7-741-100-01	Weight, 200 grams	–	o	–	–
23	J-6040-320-A	Tension Adjustment Tool	–	o	o	–
24	7-732-050-10	Sector Gauge, 20 grams	–	o	–	–
25	J-6041-650-A	Tension Arm Bending Tools	–	o	o	o
26	J-6041-660-A	Stop-ring Plier	–	–	–	o
27	J-6040-070-A	Eccentric Screw Driver	–	o	o	–

Switching Regulator Adjustment Fixture

Sony Part No. J-6043-640-A

Used for check and adjustment the switching regulator board inside the power unit.

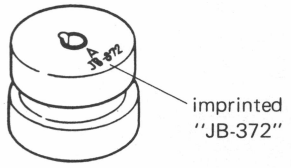




Brake Adjustment Fixture

Sony Part No. J-6043-720-A

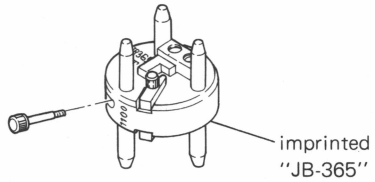
Used when replacing the reel motor, brake band or brake solenoid.

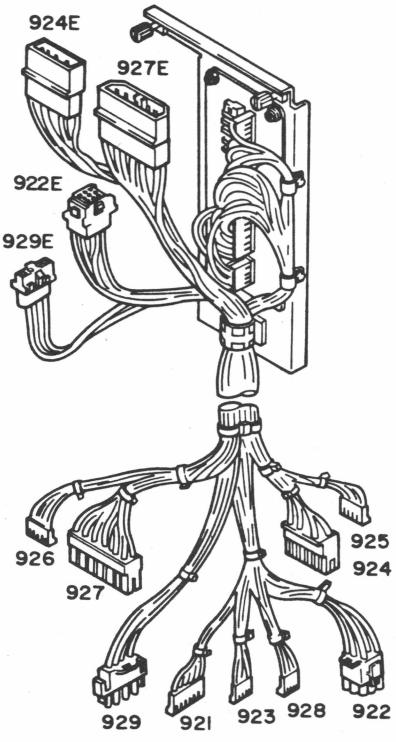


Guide Flange Fixture Sony Part No. J-6043-870-A

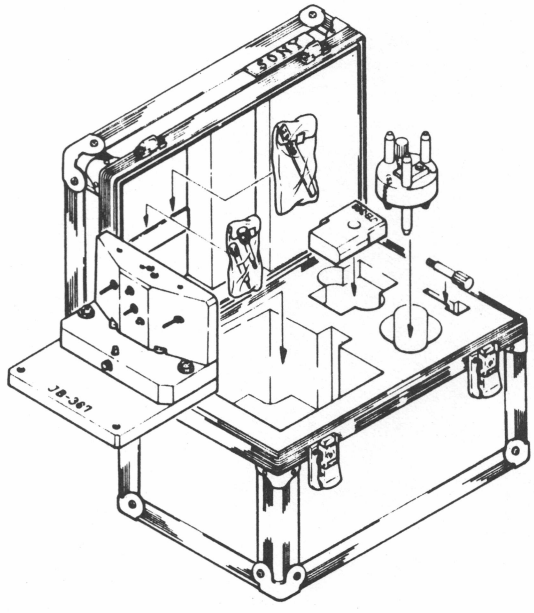
Used when fixing the guide flange of the entrance or exit slant guide assembly on the guide post.

The spacer (Sony Part No. J-6044-000-A) is included in this fixture. For replacement of the guide flange, contact your sony service office.





The guide flange fixture is also included in the following guide replacement fixture kit (Sony Part No. J-6043-730-A) for the BVH-1000/1100/1100A/1180.



4-7. ALIGNMENT TAPE BR5-2NTSC

The BR5-2NTSC alignment tape is for Sony BVH series NTSC VTR.
The following signals are recorded on it.

TIMER min. sec	AUDIO USE	AUDIO CONTENTS (CH1 , CH2 , CH3)	SYNC	VIDEO CONTENTS	VIDEO USE
0.00	OUTPUT LEVEL	1 kHz, 0 VU (, ,) *1	*3 *4	75% COLOR BARS	GENERAL
0.30	PHASE	3 kHz, 0 VU (, ,)		LINEARITY	DG, DP
1.00	PHASE	15 kHz, 0 VU (, ,)		MULTIBURST *4	FREQUENCY RESPONSE
1.30					
1.40	OUTPUT LEVEL	1 kHz, 0 VU (, ,) *1	*3	75% COLOR BARS	GENERAL PERFORMANCE CHECK
2.40	PHASE	3 kHz, 0 VU (, ,)			
3.40	PHASE	15 kHz, 0 VU (, ,)			
4.35					
4.45	FREQUENCY RESPONSE (every 25 sec)	1 kHz (←REFERENCE→)	*3	75% COLOR BARS	GENERAL PERFORMANCE CHECK
5.45		50 Hz (, ,) *2			
		100 Hz (, ,)			
		200 Hz (, ,)			
		300 Hz (, ,)			
		500 Hz (, ,)			
		3 kHz (, ,)			
		5 kHz (, ,)			
		7.5 kHz (, ,)			
		10 kHz (, ,)			
		15 kHz (, ,)			
9.50					
10.00	NIL	BLANK	BLANK	RF Sweep	RF FREQUENCY RESPONSE
11.50					
12.00	NIL	BLANK	*3	LINEARITY	DG, DP
16.50					
17.00	NIL	BLANK	*3 *4	MULTIBURST *4	FREQUENCY RESPONSE
18.50					
19.00	NIL	BLANK	*3	100% WHITE	TRACKING
30.00					

*1 When playing back this tape, check/adjust the machine so that its audio output level is the nominal level (0 VU) plus the calibration level (dB) as follows.
ex. calibration level = –0.5 dB
actual output level = 0 VU –0.5 dB

*2. When playing back this tape, check/adjust the audio frequency response of the machine so that its output level at each frequency is the reference level at 1 kHz plus the calibration level (dB).

*3. The VITS is recorded.

SYNC CHANNEL	LINE 10	2T & 12.5T
	LINE 11	LINEARITY
	LINE 12	LINEARITY
	LINE 13	LINEARITY
	LINE 14	MULTIBURST
	LINE 15	75% COLOR BARS
VIDEO CHANNEL	LINE 17	2T & 12.5T
	LINE 21	MULTIBURST

*4. The MULTIBURST signal amplitude calibration

	SYNC CH	VIDEO CH
3.58 MHz	_____ dB	_____ dB

(reference; 0.5 MHz)

WARNING

TAPE MUST BE STOPPED IN THE BLACK SEGMENTS ONLY. STOPPING FROM REWIND OR FAST FORWARD, AND STARTING THE REWIND OR FAST FORWARD MUST BE MADE IN THE BLACK SEGMENTS ONLY.

NEVER PUT THE MACHINE INTO JOG OR STILL MODE WHILE ALIGNMENT TAPE IS THREADED. ABOVE CONDITION MUST BE MET TO AVOID A POSSIBLE DAMAGE TO THE TAPE AND TO PROLONG THE LIFE EXPECTANCY OF THE HIGHLY CALIBRATED ALIGNMENT TAPE.

CAUTION

1. *KEEP THIS TAPE AWAY FROM STRONG MAGNETIC FIELDS.*
2. *AVOID STORAGE AT HIGH TEMPERATURES. MAXIMUM STORAGE TEMPERATURE IS 40 °C (104 °F).*

4-8. MOUNTING OF REC INHIBIT SWITCH ON FRONT PANEL

Applicable to BVH-2000 # 10001 to # 11399
Applicable to BVH-2000PS # 10001 to # 11199
Applicable to BVH-2000PM # 10001 to # 10199

The machines with serial numbers higher than above and all BVH-2500 series VTRs have been modified at the factory.

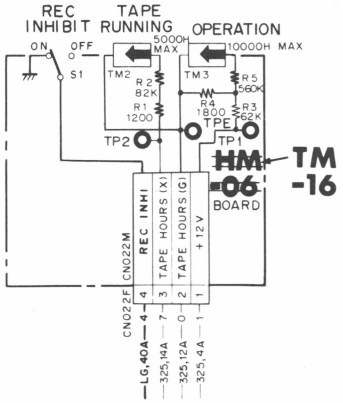
When mounting the REC INHIBIT switch on the front panel of the BVH-2000/PS/PM with serial No. as shown above, use the optional BVH-KIT3 parts kit. For the modification procedure, refer to the BVH-2000/PS/PM SUPPLEMENT-4 (BVH-KIT3). Another REC INHIBIT switch is mounted on the LG-02 board and relationship between them are as follows.

REC INHIBIT Switch		REC INHIBIT
Front Panel	LG-02 Board	State
ON	ON	ON
ON	OFF	ON
OFF	ON	ON
OFF	OFF	OFF

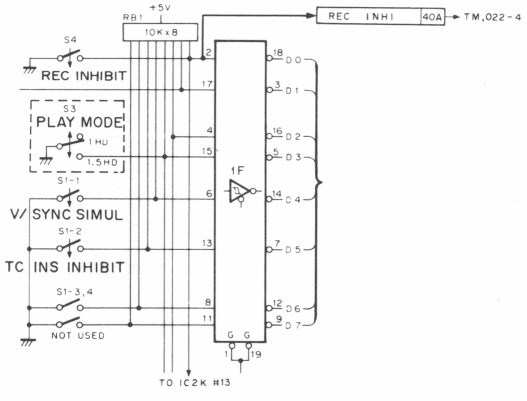
Circuit after modification

FRAME WIRING (1/2)

TAPE TRANSPORT

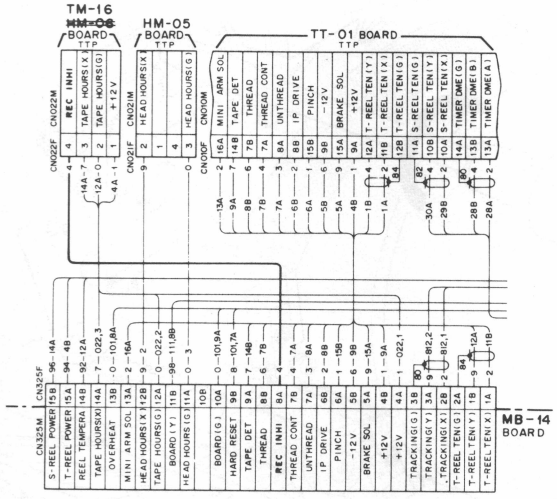


LG-02 board

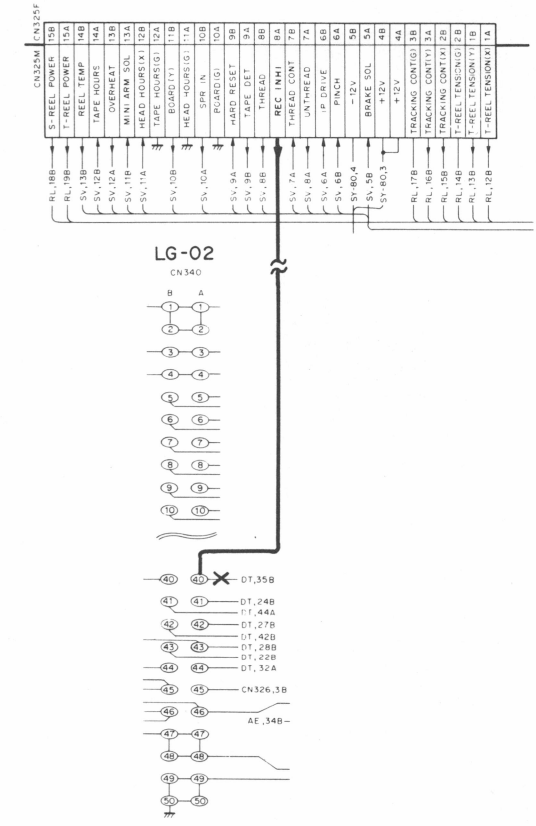


FRAME WIRING

CARD RACK

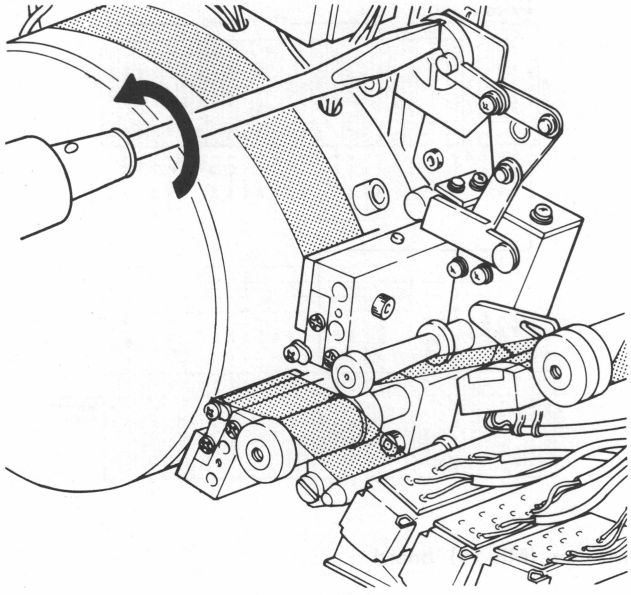


Mother (MB-14) board



4-9. MANUAL OPEN/CLOSE OF MOVABLE GUIDE

The movable guide can be opened and closed manually using the flat blade screwdriver.



SECTION 6
REPLACEMENT

This section provides procedures for replacement and the subseqent adjustment which require some preliminary knowledge. The parts not described here are provided in Section 3 or exploded views in Section D.

6-1. V/S ERASE HEAD REPLACEMENT

Preliminary Information

If the leads of the V/S erase head are caught on the harness holder for the audio/CTL head, the V/S erase head can not be set in the correct position and it may cause double recording in the REC mode.

Replacement

1. Go to the rear of the machine and open the power supply and remove the connector CN383 from the BE-02 boad.
2. Loosen the V/S screw and remove the V/S erase head assembly.
3. Remove the harness from the V/S erase head, then remove the head. (See Fig. 6-1.)
   Note: The spacer will be used again.
4. After replacing the head, assemble the parts in the reverse order of step 3.
5. Solder the harness to the head. (See Fig. 6-2.)
6. Mount the V/S erase head in the order of steps 2 and 1.
7. Connect the connector CN383 to the BE-02 board.

Adjustment

8. Turn the threading motor with a flat-blade screwdriver to close the slant guide and make sure that the leads of the V/S erase head are not caught on the harness holder.
9. Check the height of the V/S erase head, referring to Section 3-24-12.

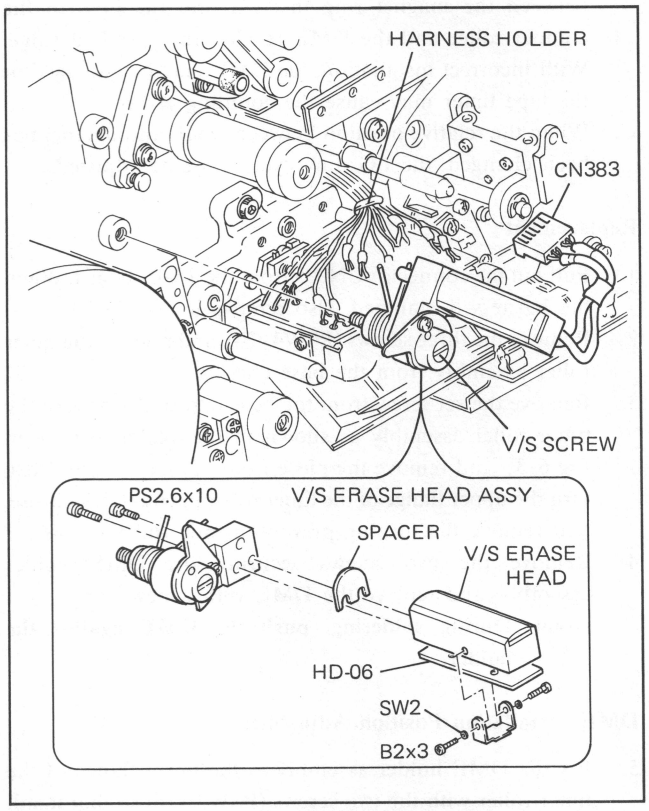


Fig. 6-1. V/S Erase Head Replacement

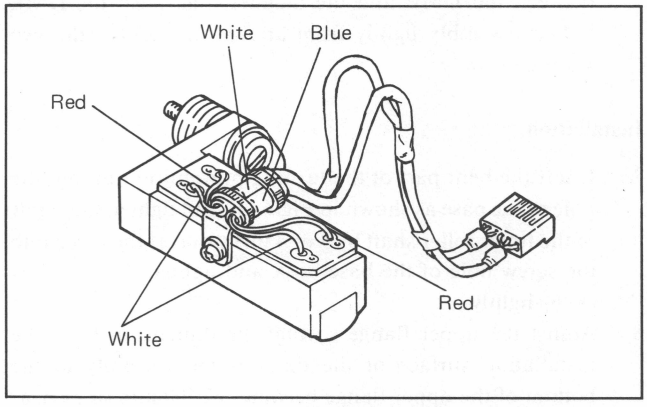


Fig. 6-2. Soldering Leads

6-2. DME REPLACEMENT

Preliminary Information

A. Spacers may be inserted at the base of the timer roller assembly. These spacers must be reinstalled at their positons after DME replacement, and they may not be lost or installed in different positions.
B. Installation must be carried out so that the clearance between the magnet ring inserted into the boss of the counter roller and the DME reaches the specified value. With incorrect installation, the DME may be damaged or the tape timer may cause the counting errors.
C. When the relative position between DME and magnet has been changed, the FG duty cycle must be adjusted.

Replacement

1. Pull out the connector CN005 from the TT-01 board. When the harness is clamped, also remove it.
2. Remove the three screws (PSW4×20), and remove the timer roller assembly from the base chassis.
3. Remove the set screw from the boss part of the base of the timer roller assembly as shown in the exploded view in Fig. 6-3, and remove the piece from the screw hole. Next, turn the upper flange of the timer roller in counterclockwise, and remove the turning prevention nut and the base.
4. Remove the two screws securing the DME holder assembly, and replace the DME with a new one.
   Note: During soldering, push the DME against the holder.

DME Installation Position Adjustment

5. Fix the DME holder assembly to the lower flange of the timer roller with the two screws (PSW2.6×6) so that it still can be moved lightly.
6. Insert a thickness gauge with a thickness of 0.3 mm between the DME and the magnet ring, push the DME holder assembly lightly from above, and tighten the two screws securely.

Installation

7. Insert the bent part of the turning prevention nut into the hole of the base as shown in Fig. 6-3 , and tighten the screw of the timer roller shaft by 3 or 4 turns. Insert the piece into the screw hole of the base boss, and tighten the set screw (4×6) lightly.
8. Adjust the upper flange so that the dimension from the installation surface of the timer roller assembly to the bottom of the upper flange becomes 62.700 mm or as near as possible referring to section 3-24-2, and then tighten the set screw driven in the preceding step securely.
9. Fix the timer roller assembly securely with the three screws (PSW4×20) to the base chassis. When spacers had been used, reinstall them in their original positions.
10. Plug the connector CN005 to the TT-01 board, and clamp the harness again in the original position.

Tape Path Confirmation

11. Thread a tape, and set the machine in REC mode. Confirm that the tape is in light contact with the upper flange of the timer roller assembly and that the tape does not curl. Also confirm that the tape does not curl near the T-tension arm. If necessary, adjust the height of the upper flange and/or the slant of the timer roller referring to section 3-24-2. Confirm the tape path in the same way in F.FWD mode and REW mode.

FG Duty Cycle Adjustment

12. Adjust the FG duty cycle of the timer roller according to steps 3 to 7 of section 3-23-1.

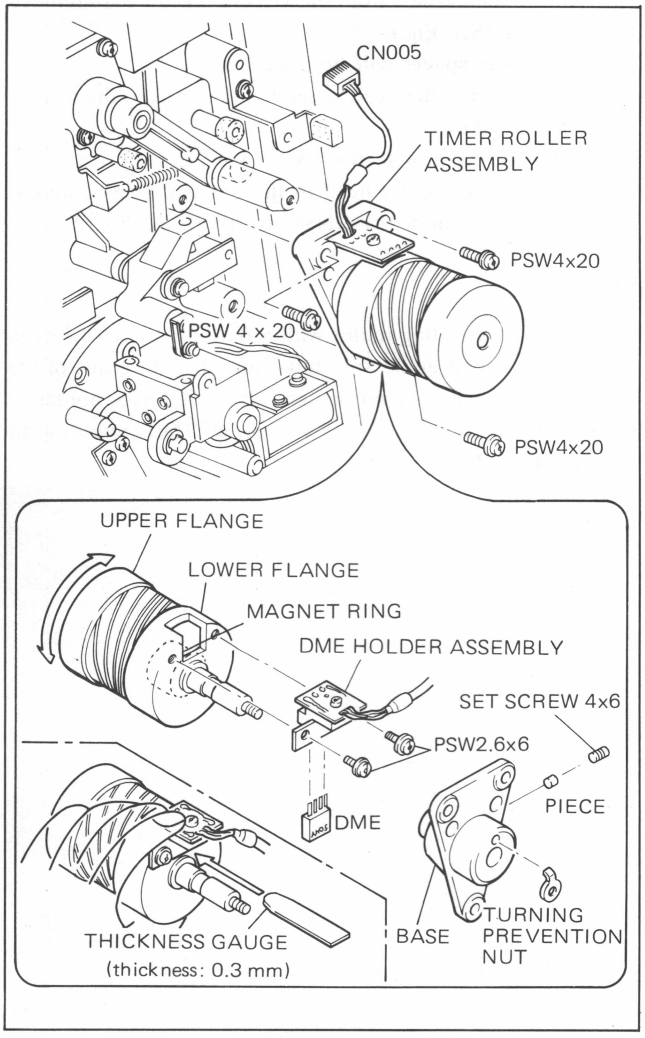


Fig. 6-3. DME Replacement

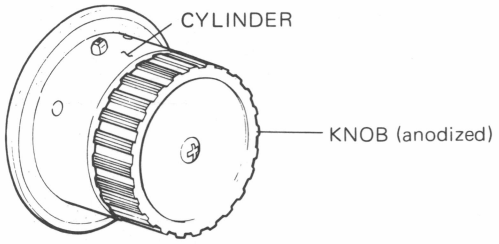
6-3. REEL MOTOR ASSY REPLACEMENT

Preliminary Information

A. The mechanical brake built in reel motor assembly operates when the power has been turned off during tape running or when no tape has been detected by tape sensor, and then the mechanical brake operates together with electromagnetic brake. The combined brake force can be displayed at ND1 on the SV-43 board by "TEST" mode. The displayed value indicates the decerelation of the reel rotation speed every unit time, and the value shows that the higher the value is, the stronger the brake force is.

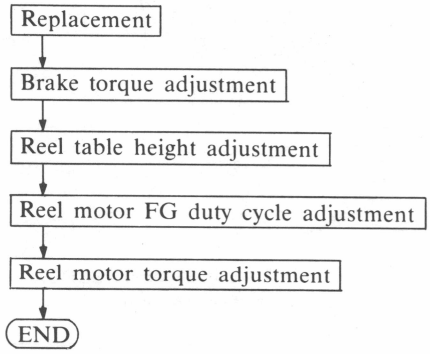
B. The cylinder of the reel table supplied as the reel motor assembly, is made of nickel-plated brass.
If replacing the reel table made of nickel-plated brass with other reel table, check the material of the cylinder before adjustment, because the adjusting value of the brake torque differs in the material.

C. Distinction of reel table



color of cylinder and knob	same	different
surface treatment of cylinder	anodized	nickel-plated

D. Replacement and the subsequent adjustment for the reel motor assembly must be performed as follows.



6-3-1. S Reel Motor Assy Replacement

Replacement

1. Turn off the power and remove the front panels.
2. Remove the cover and reel washer shown in Fig. 6-4.
3. Remove the connector CN001 from the TT-01 board.
4. Go to the rear of the machine and open the power supply block. Remove the connectors CN204, CN206, and CN209 from the RA-05 board and remove the harness of CN209 from the clamp.
5. Remove four PSW4×16 screws securing the reel motor assembly.
6. To install the new assembly, reverse removal procedure.

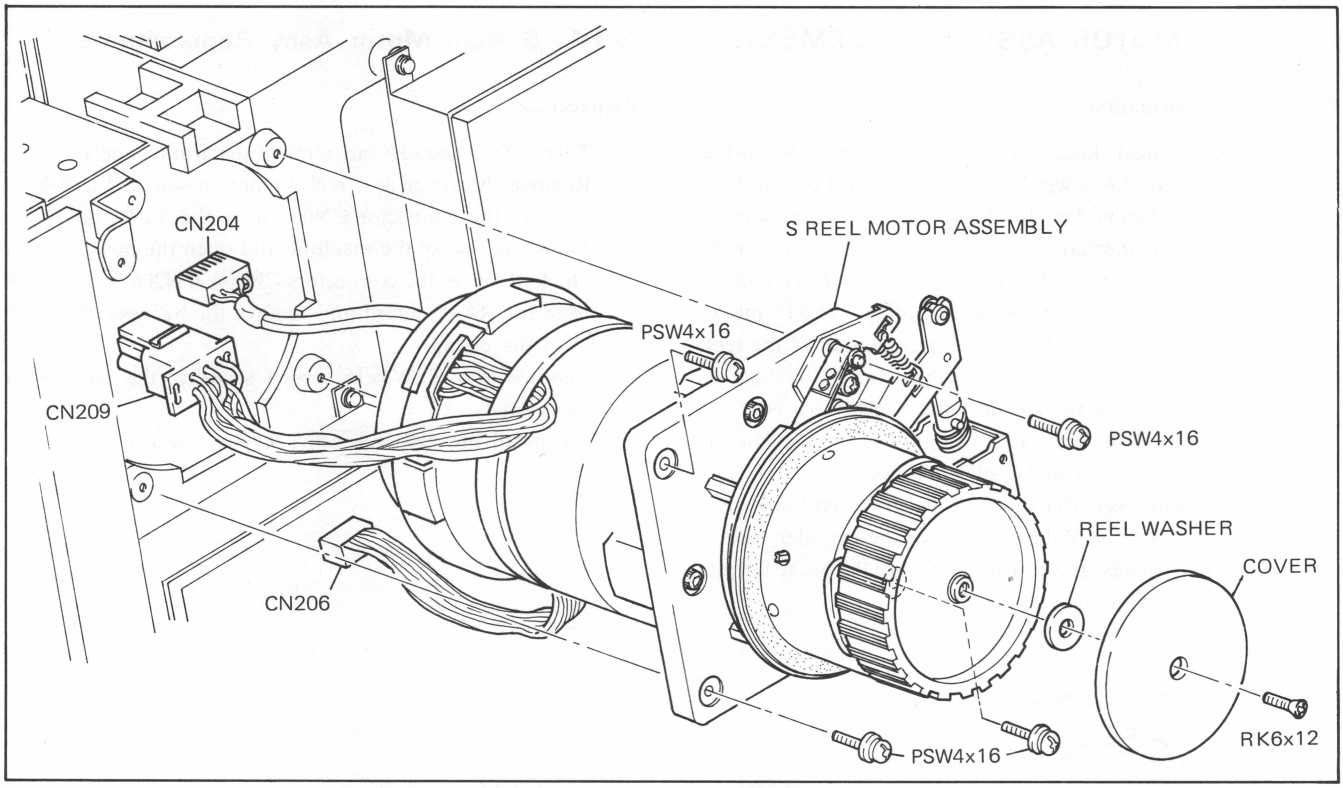


Fig. 6-4. S Reel Motor Assembly Replacement

Reel Table Height Adjustment

7. Thread a recorded tape without wrinkles and damage. Check that the tape does not come in contact with the reel flange extremely in F.FWD mode. Perform the same check in REW mode. If the tape comes in contact with the reel flange extremely, perform the following steps a, b and c. If the tape curls at the other position than the reel flange, perform the adjustments shown in section 3-24-2.
   a. Remove the tape, cover and reel washer (see Fig. 6-5).
   b. Loosen the two set screws securing the reel table, and turn the height adjustment screw.

   Note 1: One turn of the screw changes the height by 0.7 mm.

   Note 2: Turn the screw as follows.
   - **If the tape contacts the upper reel flange, turn the screw clockwise.**
   - **If the tape contacts the lower reel flange, turn the screw counterclockwise.**

   c. While pushing the reel table lightly to the motor, tighten the two set screws. Check the height of the reel table again and then reinstall the reel washer and the cover.

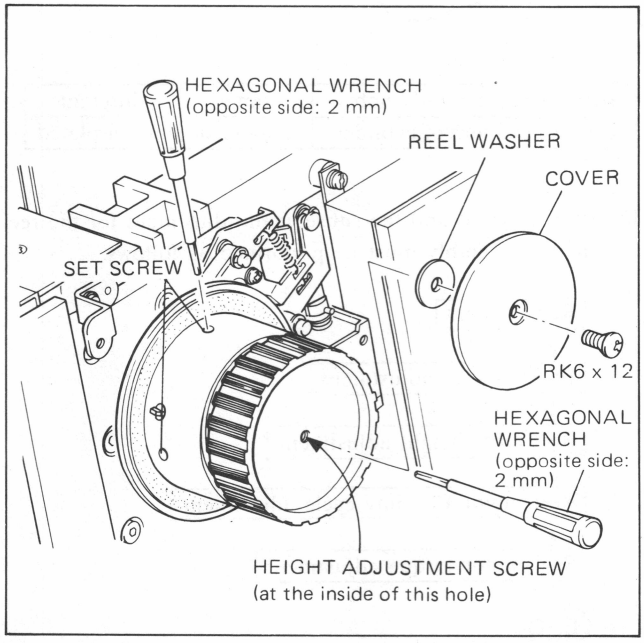


Fig. 6-5. S Reel Table Height Adjustment

FG Duty Cycle Adjustment

8. Adjust as follows so that the motor FG duty cycle in FWD 3 times normal speed is 50%.
   ① Thread a recorded tape.
   ② Turn on the power. Set S4 (TEST-1) switch on the CD-17 board to "1", and depress S7 (ENTRY) switch for at least 0.5 sec.
   ③ Connect an oscilloscope to TP3 on the RL-12 board, and set the machine in FWD 3 times normal speed mode.
   ④ Confirm that the duty cycle of the waveform at TP3 is 50%. If necessary, adjust RV2.
   ⑤ Connect the oscilloscope in the same way to TP14 of the RL-12 board, and confirm that the duty cycle in FWD 3 times normal speed mode is 50%. If necessary, adjust RV4.
   ⑥ Set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec. (This cancels the test mode.)
   ⑦ Remove the tape.

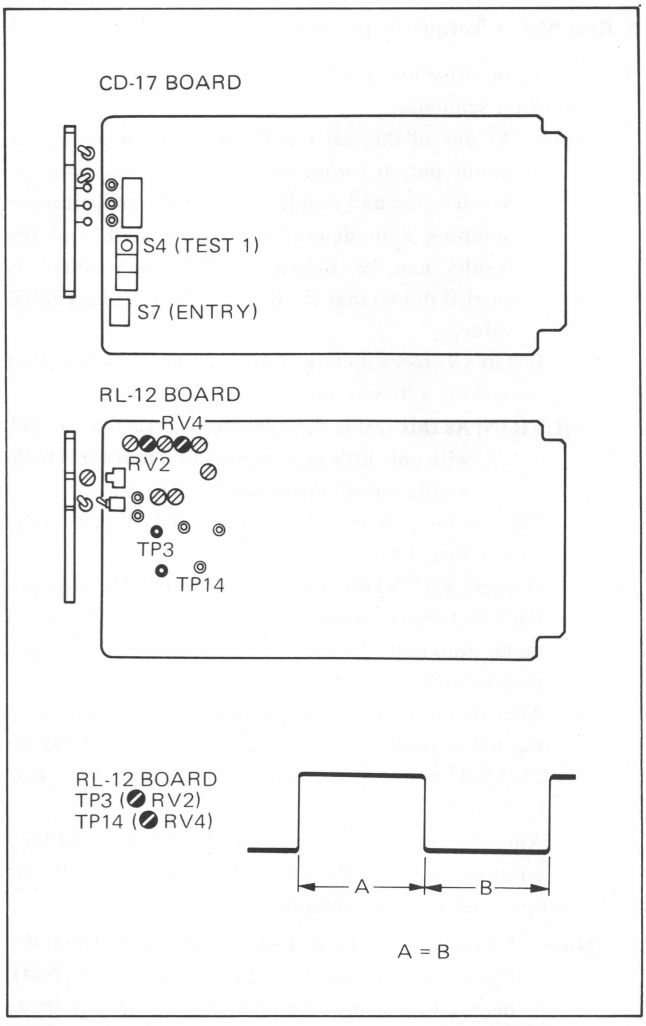


Fig. 6-6. S Reel Motor FG Duty Cycle Adjustment

S Reel Motor Torque Adjustment

9. Adjust the drive torque of the reel motor according to the following sequence.

Note: As one of the test functions of the machine, the motor output torque can be calculated from the acceleration and deceleration time by activating or stopping a predetermined inertia load, and the results can be indicated. Then adjustment is carried out so that the display shows the specified value.

a. Install a 9" reel with tape fully wound and the tape end fixed with adhesive tape on the S reel table.

CAUTION: As this reel is the reference inertia load, a reel with only little tape wound onto it or a reel with a different diameter must not be used.

b. Turn on the power and set S4 (TEST 1) switch on the CD-17 board to "2".

c. Depress S7 (ENTRY) switch on the CD-17 board until the S reel starts to rotate. (By this operation, the S reel motor automatically executes the sequence of forward, reverse and stop.)

d. After motor stops, confirm that the number shown in Fig. 6-7 is indicated by the display element ND1 on the SV-43 board. If necessary, adjust RV1 on the RA-05 board.

After the adjustment, again carry out step c, and then confirm step d. Repeat this sequence until the specified value is obtained.

Note: When RV1 is turned clockwise by one division, the figure of the upper digit displayed on ND1 decreases one and when RV1 turned counterclockwise by one division, the figure increases one.

e. Remove the inertia load reel.

Note: When this reel is to be used for general recording, carefully remove the adhesive where the tape was fixed with adhesive tape, or cut off about 80 cm of the tape from the tape end. If the tape is used with adhesive on it, the head may be clogged, or the tape may be wound around the guide.

f. Set the switch S4 on the CD-17 board to "0", and depress the switch S3 (RESET) on the SY-80 board.

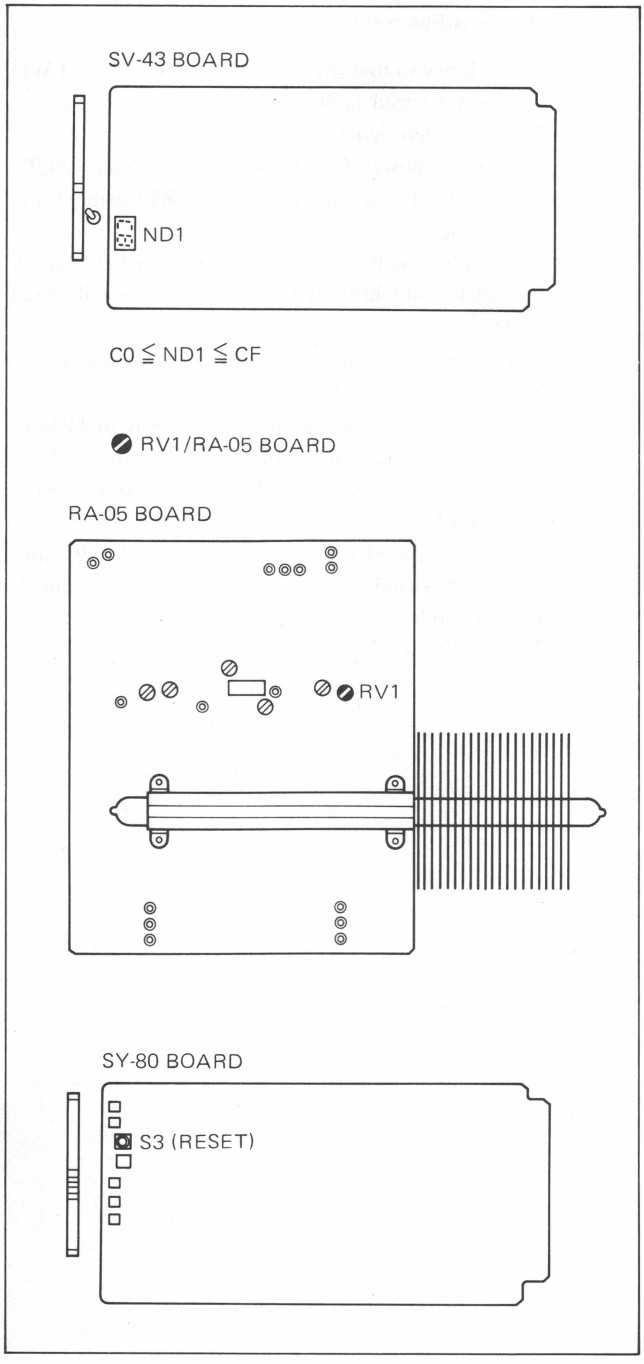


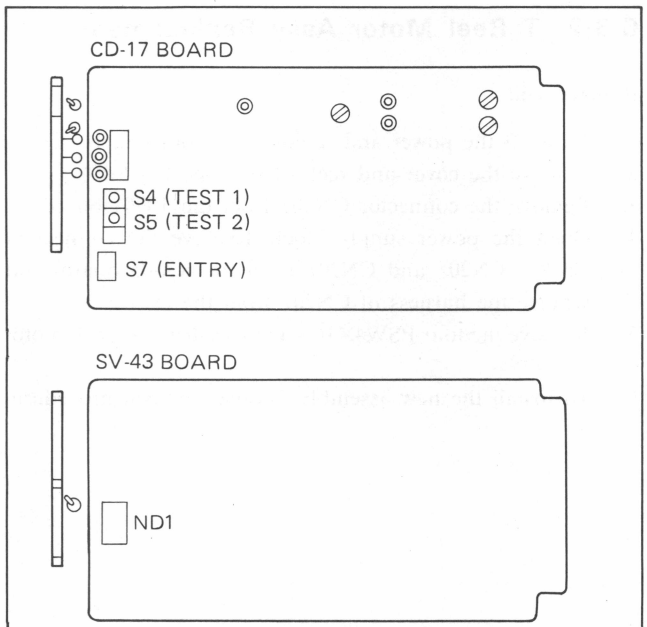
Fig. 6-7. S Reel Motor Torque Adjustment

Mechanical Brake Torque Adjustment

Note 1: When measuring the brake torque, be sure to use a 9-inch empty reel.

Note 2: The reel motor assembly supplied as a repair part includes the reel table cylinder made of nickel-plated brass. The adjusting value of the brake torque differs in the material of the reel table. When replacing the reel table with the other one, check the material of reel table referring to item C in the preliminary information.

10. Place a 9-inch empty reel on the S reel table and turn on the power.
11. Set S4 (TEST 1) on the CD-17 board to "4", and adjust the following brake torque.
    (1) FWD(CCW) brake torque
    Set S5 (TEST 2) on the CD-17 board to "A", and depress S7 (ENTRY) for at least 0.5 sec. When the rotation of the reel has stopped, confirm that the ND1 on the SV-43 board indicates the value shown in Fig. 6-8. If the value is not within specifications, change the position of the spring (FWD/CCW) as shown in Fig. 6-9.
    (2) REV(CW) brake torque
    Set S5 (TEST 2) on the CD-17 board to "B", and depress S7 (ENTRY) for at least 0.5 sec. When the rotation of the reel has stopped, confirm that the ND1 on the SV-43 board indicates the value shown in Fig. 6-8. If the value is not within specifications, change the position of the spring (REV/CW) as shown in Fig. 6-9.
12. Set both S4 and S5 to "0", and depress S7 for at least 0.5 sec to release the test mode.



direction of tape running (reel rotation)	TEST 1 switch position	TEST 2 switch position	Cylinder surface treatment	
			Ni-plated	anodized
FWD (CCW)	4	A	4D ± 7 (46 to 54)	57 ± 7 (50 to 5E)
REV (CW)	4	B	17 ± 3 (14 to 1A)	1A ± 3 (07 to 1D)

Fig. 6-8. Brake Torque

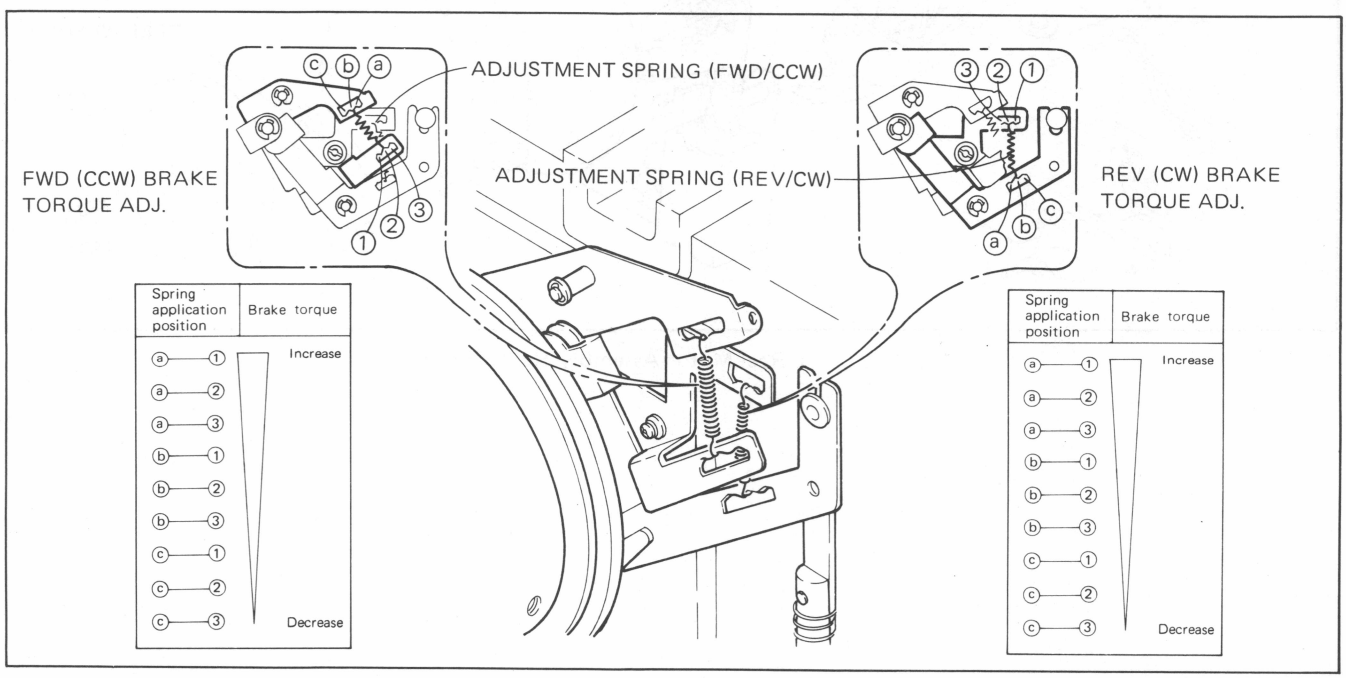


Fig. 6-9. S Reel Brake Torque Adjustment

6-3-2. T Reel Motor Assy Replacement

Replacement

1. Turn off the power and remove the front panels.
2. Remove the cover and reel washer (see Fig. 6-10).
3. Remove the connector CN002 from the TT-01 board.
4. Open the power supply block. Remove the connectors CN202, CN205 and CN207 from the RA-05 board, and remove the harness of CN207 from the clamp.
5. Remove the four PSW4×16 screws securing the reel motor assembly.
6. To install the new assembly, reverse removal procedure.

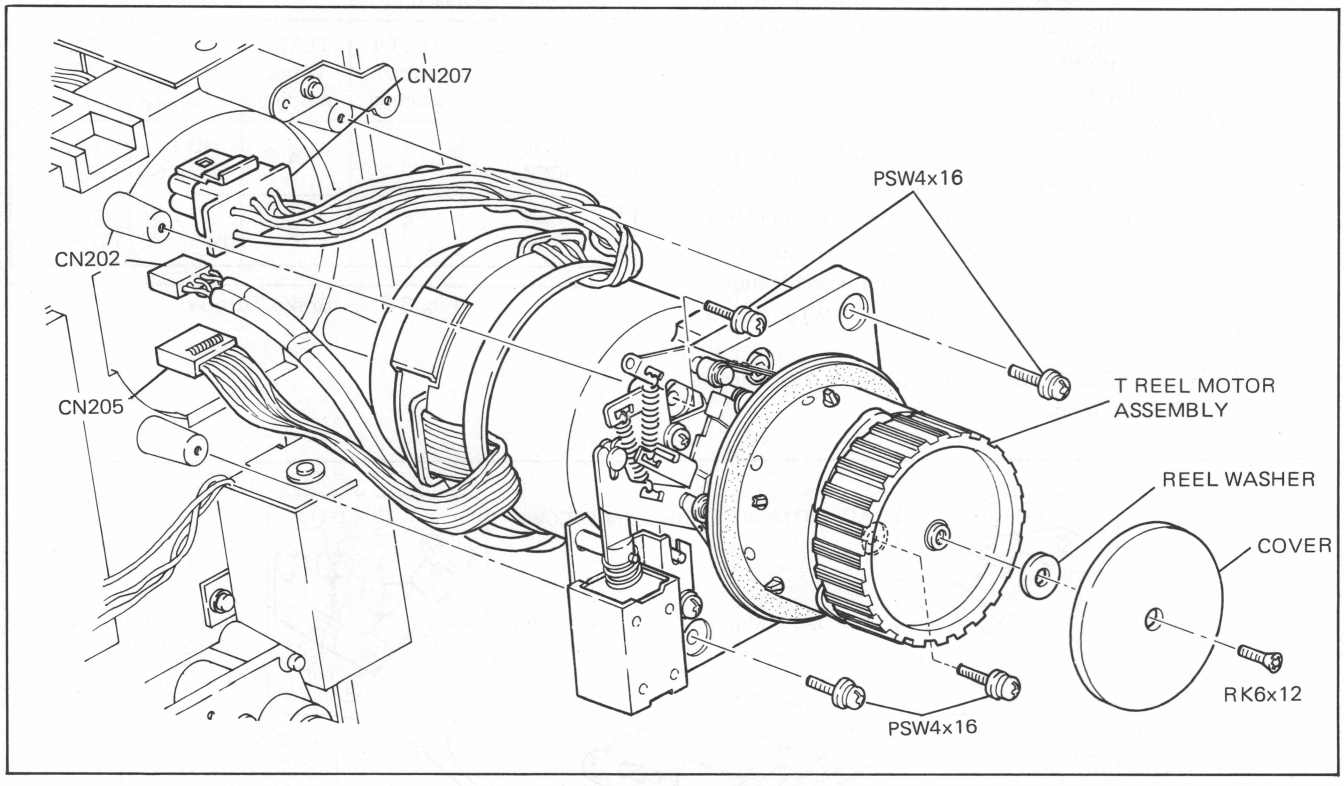


Fig. 6-10. T Reel Motor Assembly Replacement

Reel Table Height Adjustment

7. Thread a recorded tape free of wrinkles and damages. Confirm that the tape has no strong contact with the reel flange in F.FWD mode. Confirm the same thing also in REW mode. If there should be strong contact, adjust according to the following steps. When the tape curls at a position other than the reel flange, adjust according to section 3-24-2.
8. Adjust the height according to the following sequence.
   a. Remove the tape, cover, and reel washer.
   b. Loosen the two set screws securing the reel table, and turn the height adjustment screw shown in Fig. 6-11.
      Note 1: One turn of the adjustment screw changes the height by 0.7 mm.
      Note 2: Turn the adjustment screw as follows.
      - **If the tape contacts the upper reel flange, turn the screw clockwise.**
      - **If the tape contacts the lower reel flange, turn the screw counterclockwise.**
   c. While pushing the reel table lightly against the motor, tighten the two set screws. Again confirm the height of the reel table according to step 10. and then install the reel washer and the cover.

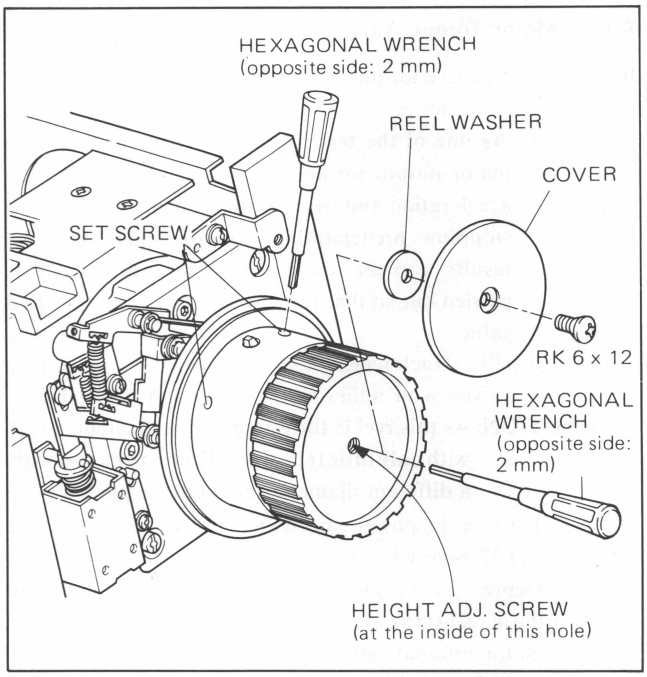


Fig. 6-11. T Reel Table Height Adjustment

FG Duty Cycle Adjustment

9. Adjust as follows so that the motor FG duty cycle in FWD 3 times normal speed is 50%.
   a. Thread a recorded tape.
   b. Turn on the power. Set S4 (TEST-1) switch on the CD-17 board to "1", and depress S7 (ENTRY) switch for at least 0.5 sec.
   c. Connect an oscilloscope to TP1 on the RL-12 board and set the unit to FWD 3 times normal speed mode.
   d. Confirm that the duty cycle of the waveform at TP1 is 50%. If necessary, adjust RV6.
   e. Connect the oscilloscope in the same way to TP2 of the RL-12 board, and confirm that the duty cycle in FWD 3 times normal speed mode is 50%. If necessary, adjust RV5.
   f. Set the switch S4 on the CD-17 board to "0", and depress the switch S7 for at least 0.5 sec. (This cancels the test mode.)
   g. Remove the tape.

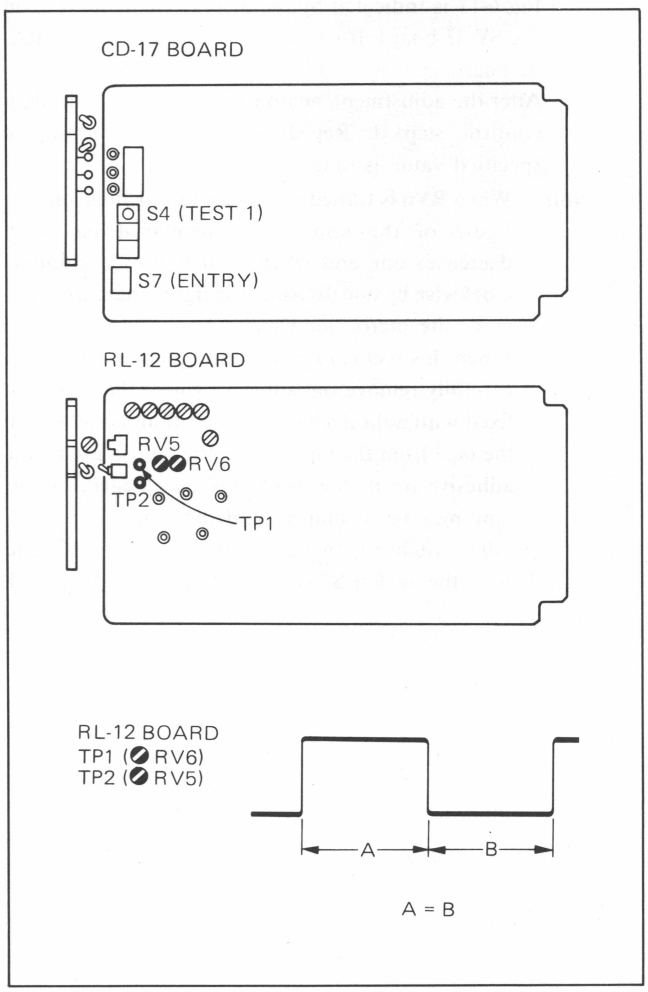


Fig. 6-12. T Reel Motor FG Duty Cycle Adjustment

T Reel Motor Torque Adjustment

10. Adjust the drive torque of the reel motor according to the following sequence.

Note: As one of the test functions of the machine, the motor output torque can be calculated from the acceleration and deceleration time by starting and stopping predetermined inertia load, and the results can be indicated. Then adjustment is carried out so that the display shows the specified value.

a. Install a 9 inch reel with tape fully wound and the tape end fixed with adhesive tape on the T reel table.

CAUTION: As this reel is the reference inertia load, a reel with only little tape wound onto it or a reel with a different diameter must not be used.

b. Turn on the power, and set S4 (TEST 1) switch on the CD-17 board to "3".

c. Depress S7 (ENTRY) switch on the CD-17 board until the T reel starts to rotate. (By this operation, the T reel motor automatically executes the sequence of forward, reverse, and stop.)

d. After motor stop, confirm that the number shown in Fig. 6-13 is indicated by the display element ND1 on the SV-43 board. If necessary, adjust RV6 on the RA-05 board.

After the adjustment, again carry out step c, and then confirm step d. Repeat this sequence until the specified value is obtained.

Note: When RV6 is turned clockwise by one division, the figure of the upper digit displayed on ND1 decreases one and when RV6 is turned counter-clockwise by one division, the figure increases one.

e. Remove the inertia load reel.

Note: When this reel is to be used for general recording, carefully remove the adhesive where the tape was fixed with adhesive tape, or cut off about 80 cm of the tape from the tape end. If the tape is used with adhesive on it, the head may be clogged, or the tape may be wound around the guides.

f. Set the switch S4 on the CD-17 board to "0", and depress the switch S3 (RESET) on the SY-80 board.

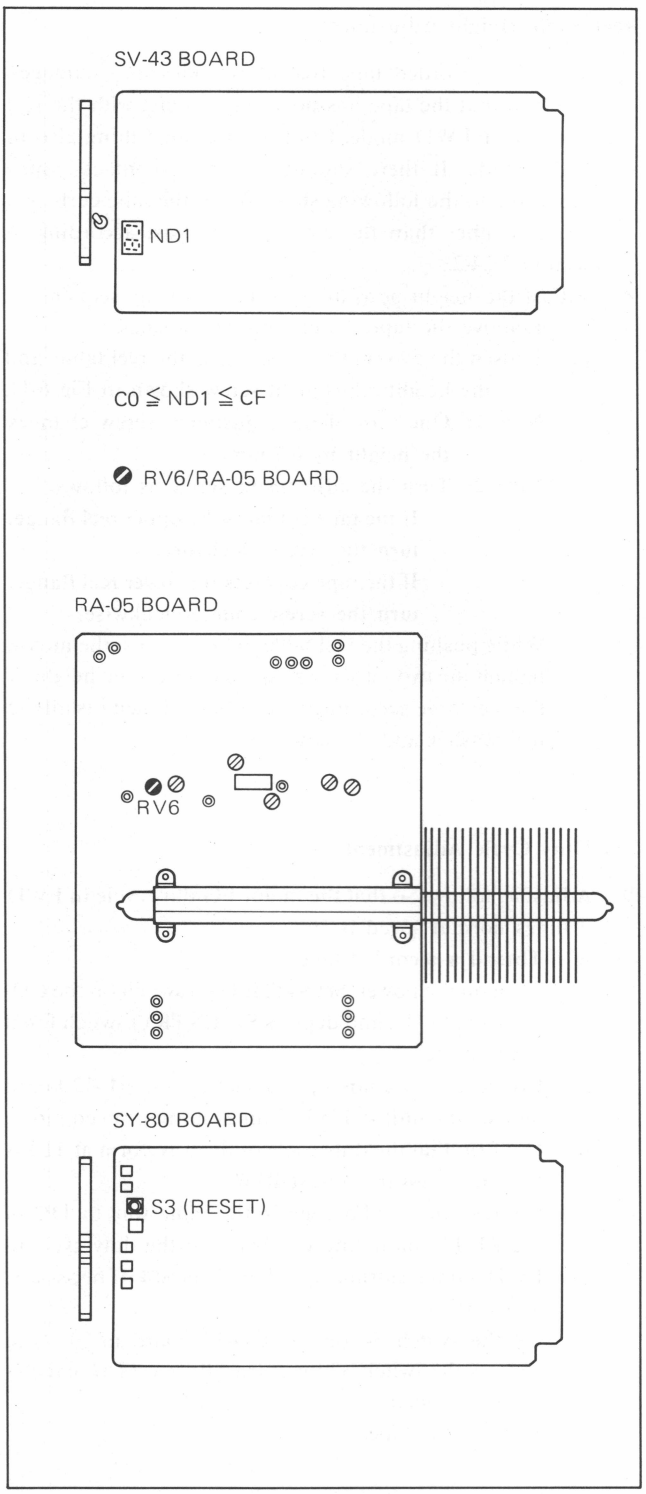


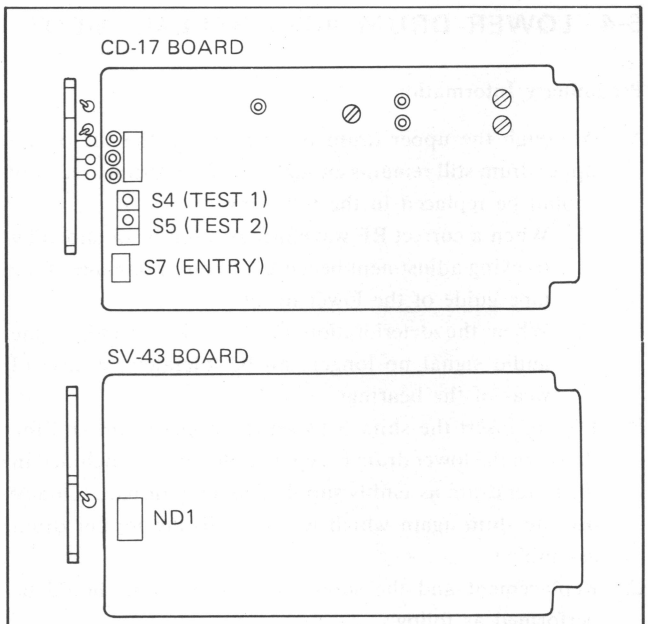
Fig. 6-13. T Reel Motor Torque Adjustment

Mechanical Brake Adjustment

Note 1: When measuring the brake torque, be sure to use a 9-inch empty reel.

Note 2: The reel motor assembly supplied as a repair part includes the reel table cylinder made of nickel-plated brass. The adjusting value of the brake torque differs in the material of the reel table. When replacing the reel table with the other one, check the material of reel table referring to item C in the preliminary information.

11. Place a 9-inch empty reel on the T reel table and turn on the power.
12. Set S4 (TEST 1) on the CD-17 board to "4", and adjust the following brake torque.
    (1) REV(CW) brake torque
    Set S5 (TEST 2) on the CD-17 board to "C", and depress S7 (ENTRY) for at least 0.5 sec. When the rotation of the reel has stopped, confirm that the ND1 on the SV-43 board indicates the value shown in Fig. 6-14. If the value is not within specifications, change the position of the spring (REV/CW) as shown in Fig. 6-15.
    (2) FWD(CCW) brake torque
    Set S5 (TEST 2) on the CD-17 board to "D", and depress S7 (ENTRY) for at least 0.5 sec. When the rotation of the reel has stopped, confirm that the ND1 on the SV-43 board indicates the value shown in Fig. 6-14. If the value is not within specifications, change the position of the spring (FWD/CCW) as shown in Fig. 6-15.
13. Set S4 and S5 to "0", and depress S7 for at least 0.5 sec to release the test mode.



ND1 (hexa-decimal display)

direction of tape running (reel rotation)	TEST 1 switch position	TEST 2 switch position	Cylinder surface treatment	
			Ni-plated	anodized
REV (CW)	4	C	4D ± 7 (46 to 54)	57 ± 7 (50 to 5E)
FWD (CCW)	4	D	17 ± 3 (14 to 1A)	1A ± 3 (07 to 1D)

Fig. 6-14. Brake Torque

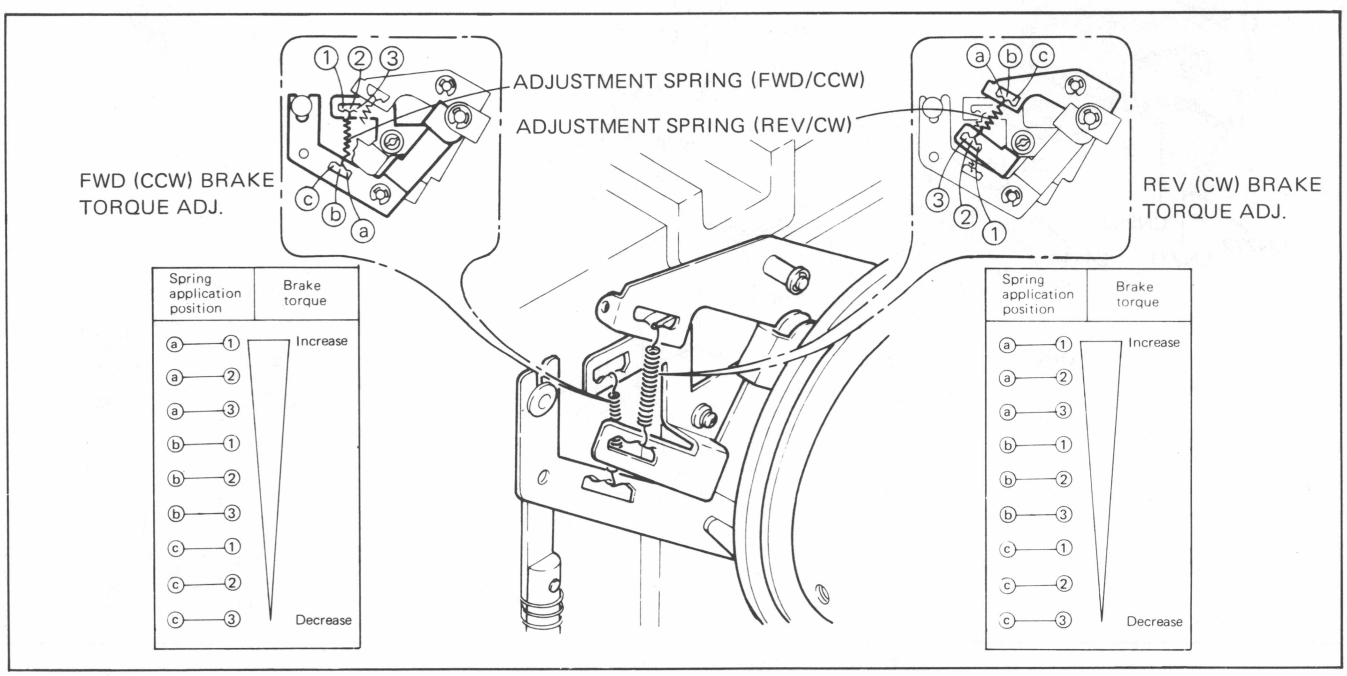


Fig. 6-15. T Reel Brake Torque Adjustment

6-4. LOWER DRUM ASSY REPLACEMENT

Preliminary Information

A. Although the upper drum is normal and the life of the upper drum still remains enough, the lower drum assembly should be replaced in the following cases.
   1. When a correct RF waveform can not be obtained by tracking adjustment because of wear or damage of the tape guide of the lower drum.
   2. When the deterioration of the video signal or the audio signal no longer can be tolerated because of wear of the bearings.

B. Do not insert the shim between the upper drum and the flange of the lower drum except that the shim is included in the lower drum assembly supplied as a repair part. (Do not use the shim again which was used in the former drum assembly.)

C. Replacement and the subsequent adjustment should be performed as follows.

Removal
↓
Lower drum assy installation
↓
Upper drum installation/eccentricity adjustment
↓
Slant guide clearance check
↓
Drum speed adjustment
↓
Tape path adjustment
(See the flowchart in section 3-24-1.)
↓
Video signal system alignment
↓
END

D. Prepare the following parts for the replacement.
Taper shaft screw: Sony part No. J-6040-460-A
Upper drum eccentricity adjustment gauge: Sony part No. J-6040-750-A or J-6040-750-B.

E. During replacement, turn off the power.

Removal

1. Remove the stationary head cover, the drum panel and the reel panel.
2. When the movable guide has been closed, turn the threading motor with a flat-blade screwdriver to open the slant guides.
3. Remove the three screws securing the drum lid.
4. Remove the three screws securing the DR-22 board.
5. Remove the two screws securing the upper drum.

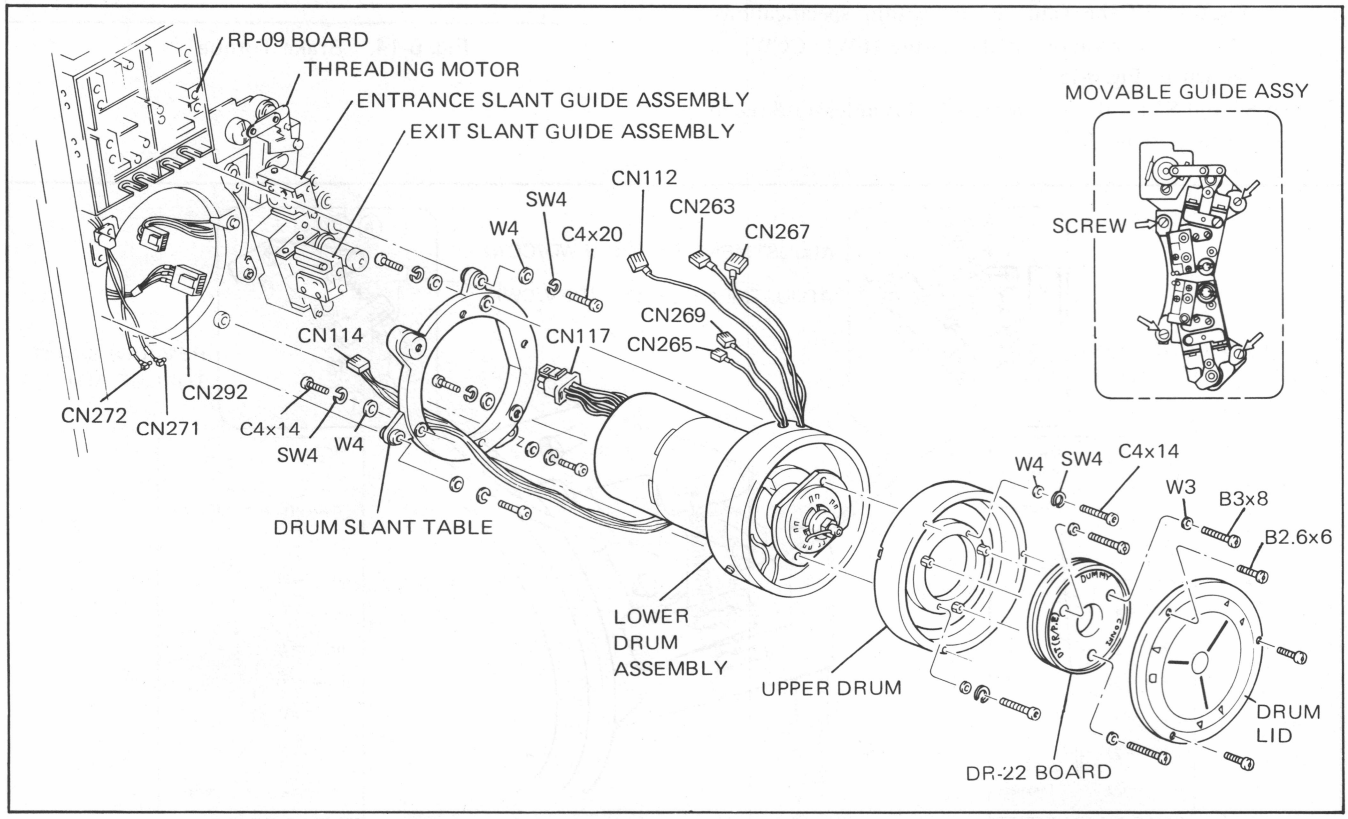


Fig. 6-16. Lower Drum Assembly Replacement

6. Go to the rear of the machine. Remove the connectors CN112, CN114 and CN117 from the DA-07 board and remove CN291 and CN292 from the motor.
7. Go to the front. Remove the shield cover for the PR-09 board, and remove the connectors CN263, CN265, CN267 and CN269.
8. Remove the connectors CN271 and CN272 connected to the side of the lower drum assembly.
9. Slightly loosen the four screws securing the movable guide, and by pushing the movable guide in the direction opposite to the head drum assembly, keep the drum stopper pin apart from the lower drum assembly.
10. While holding the lower drum assembly securely, remove the three screws and take off the lower drum assembly not to hit against the slant guide.
11. Place the lower drum assembly upside down, and remove the three screws securing the drum slant table.

Cleaning

12. Wipe the following parts with a clean cloth moistened with cleaning fluid.
    a. The surface of the entrance and exit slant guides facing the drum.
    b. The surface of the boss on which the lower drum assembly was installed.
    c. The surface of the new lower drum assembly coming in contact with the tape.

    Note: When alcohol is used as cleaning fluid, be sure to wipe the surface with a soft and dry cloth after cleaning as it tends to leave a persistent residue on the surface.

Lower drum assembly installation

13. Mount the drum slant table removed in step 11 on the new lower drum assembly with three C4×14 screws, W4 and SW4 washers.
14. Pass the connectors CN114 and CN117 through the hole in the base plate to the rear. Match the guide hole of the drum slant table to the pin A, and press the point B of the drum slant table against the pin B as shown in Fig. 6-17. Confirm that there is no clearance between the drum slant table and the bosses on the base plate and fix the lower drum assembly with three C4×20 screws, W4 and SW4 washers.
15. Put the connectors CN263, CN265, CN267 and CN269 in their designated positions on the RP-09 board.
16. Put the connectors CN271 and CN272 in the positions shown in Fig. 6-17.
17. Pass the connector CN112 through the hole in the base plate to the rear.
18. Go to the rear of the machine, and put the connectors CN112, CN114 and CN117 in their designated positions on the DA-07 board.
19. Put the connectors CN291 and CN292 in their designated positions at the rear of the drum.

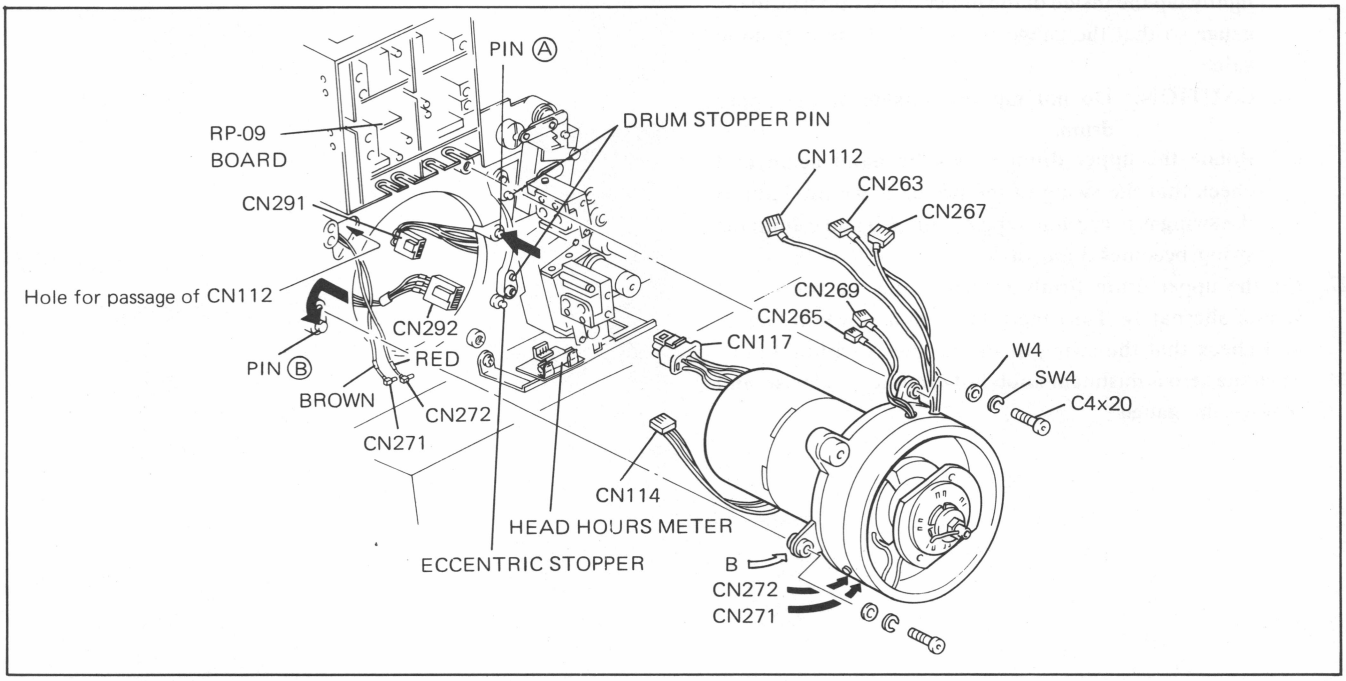


Fig. 6-17. Lower Drum Assembly Installation

Upper Drum Installation & Eccentricity Adjustment

20. Tighten two taper shaft screws securing the upper drum alternately.

    CAUTION: Even if the shim has been inserted between the upper drum and the lower drum before replacing, do not use the shim again, however, if the shim is supplied with the new lower drum assembly, be sure to use it.

21. Remove the taper shaft screw near the video head and put a C4×14 screw, SW4 and W4 washers in the hole where the taper shaft screw had been mounted, and also replace the other taper shaft screw with a C4×14 screw, SW4 and W4 washers, and then loosen the two screws 1/2 or one turn.
22. Check that the tip of the dial gauge probe is at the center of the white plastic pin inserted in the measurement arm. If it is not at the center, adjust the position of the dial gauge probe.
23. Turn the zero adjustment knob fully counterclockwise, and place the stopper of the gauge on the lower side of the lower drum and tighten the fixing knob.
24. Move the gauge in the direction A shown in Fig. 6-18 and pull it fully in the direction B and then turn it slowly back toward the drum.
25. Adjust the zero adjustment knob so that the gauge indicates zero.
26. Slowly rotate the upper drum clockwise and check that the swing of the needle is within 3 μm.

    If the swing of the needle is over 3 μm, adjust as follows.

    a. Rotate the upper drum slowly clockwise by hand and stop at the position where the gauge shows the maximum value.
    b. With the handle of a screwdriver or a nylon hammer, lightly tap the inside of the upper drum opposite to the gauge so that the gauge shows 1/3 of the maximum value.

       CAUTION: Do not tap the outside of the upper drum.

    c. Rotate the upper drum slowly by hand again and check that the swing of the needle is within 3 μm. If the swing is over 3 μm, repeat steps a, b and c, until the swing becomes 3 μm or less.

27. Fix the upper drum firmly by tightening the two C4×14 screws alternately. Turn the upper drum slowly by hand, and check that the swing of the needle is within 3 μm.
28. Turn the zero adjustment knob fully counterclockwise, and remove the gauge.

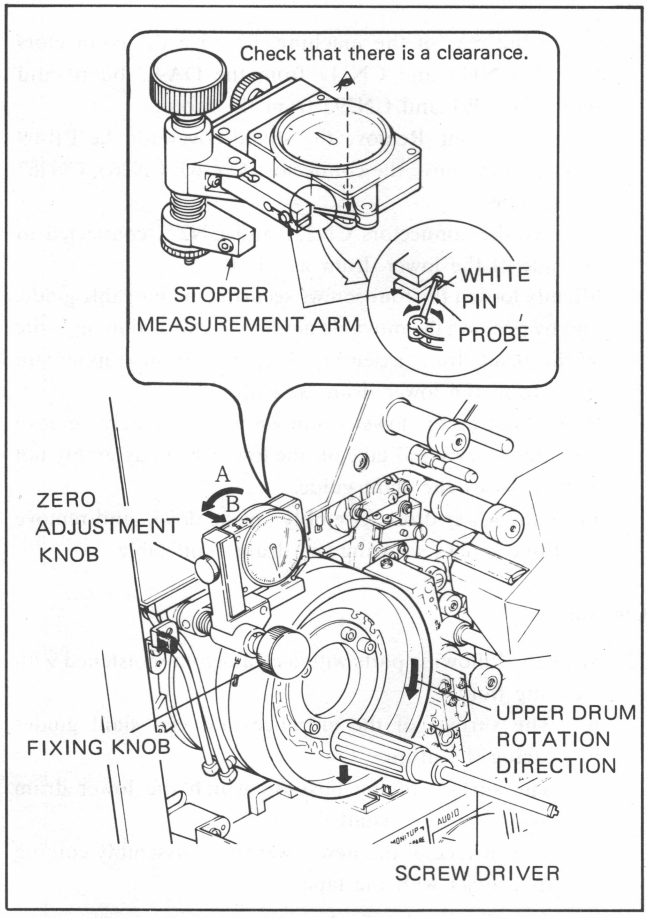


Fig. 6-18. Upper Drum Installation and Eccentricity Adjustment.

29. Clean each contacts of the DR-15, DR-22 and DR-23 boards with clean and dry cloth.
30. Match the head name of the DR-22 board to that of the DR-23 board and fix the board with three B3×8 screws and W3 washers.
31. Match the head name of the upper drum lid to that of the DR-22 board and fix the lid with three B2.6×6 screws.

Gap Confirmation

32. While pushing the movable guide assembly simultaneously in both directions of the lower drum assembly and the eccentric stopper shown in Fig. 6-17, tighten the four screws securely.
33. Insert a 50 μm-thick paper (or video tape folded in two) between the upper drum and the movable guide including the guide flanges.
34. Turn the threading motor with a flat-blade screwdriver to close the movable guide and check that the paper or video tape inserted in step 33 can move smoothly.

Drum Speed Adjustment

35. Turn on the power and set S4 (TEST 1) on the CD-17 board to "D" and press S7 (ENTRY) for at least 0.5 sec.
36. Set the machine in STANDBY mode, and check that either of the following is displayed or the following is displayed alternately on the display element ND1 on the SV-43 board. If the different numbers are displayed, adjust RV4 on the CD-17 board.
    ND1 display: FD, FE, FF, 00, 01 or 02
37. Turn off the power to release the test mode.
38. Mount the reel panel, the stationary head cover and the drum panel.
39. Perform the tape path adjustment in accordance with the flowchart shown in section 3-24-1.

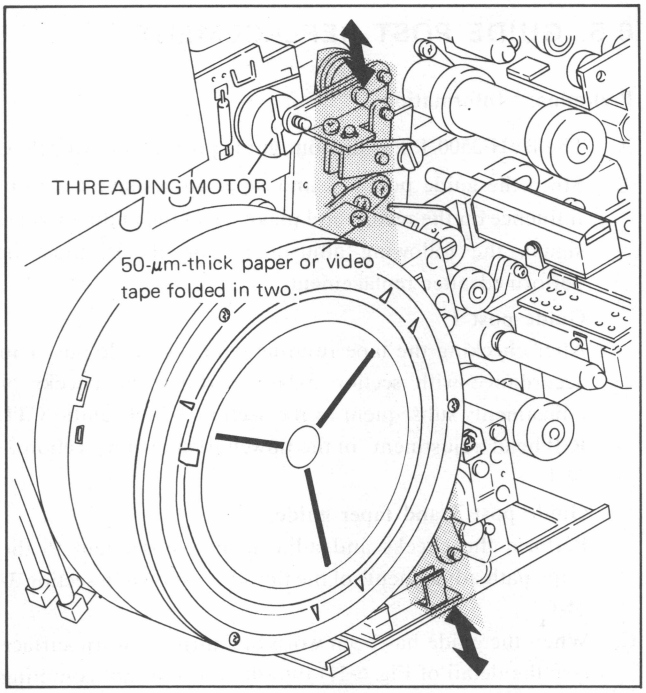


Fig. 6-19. Gap Confirmation

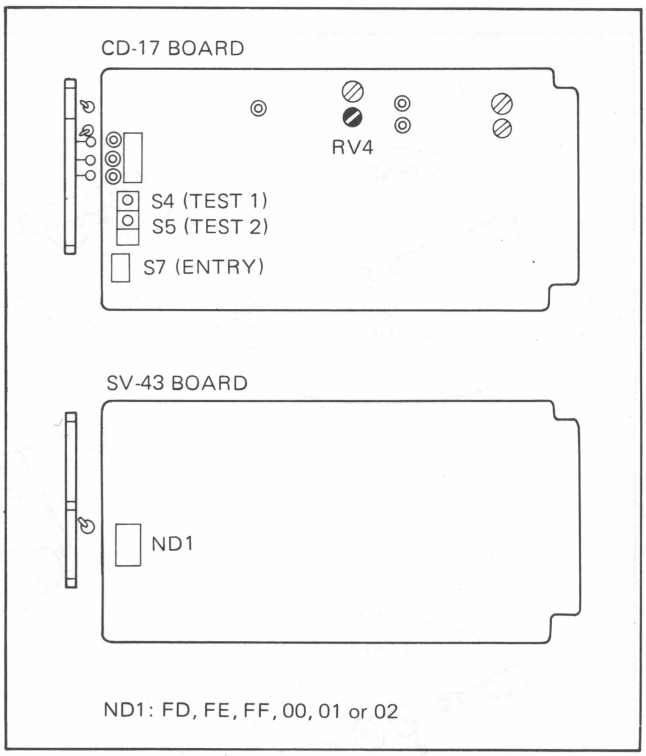


Fig. 6-20. Drum Speed Adjustment

6-5. GUIDE POST REPLACEMENT

Preliminary Information

A. The BVH-2500/P has the four guide posts as shown below.

B. Since the guide post 1, 3 and taper guide have a serious influence on the record and playback of the audio or video signal, the following adjustments or checks must be performed after replacement.

Guide post 1:

After checking the tape running near the guide post 1 in accordance with section 3-24-2, perform the checks or adjustments subsequent to the section 3-24-9 "audio/CTL R/P head adjustment" of the flowchart shown in section 3-24-1.

Guide post 3 and taper guide:

Perform the checks and adjustments subsequent to the "tape path adjustment" of the flowchart shown in section 3-24-1.

C. When the guide has been worn out, turn the worn surface (see the detail of Fig. 6-21) into the position not comming in contact with the tape and check each item of the above B.

Replacement

1. Replace the defective part, referring to Fig. 6-21.
   Note: For the guide post 3 and taper guide, take notice of the direction of the spring.
2. Perform the adjustments of each item of the above B.
   Note: For the S-tension arm, perform the tape tension adjustment shown in section 3-24-3 when the guide is worn out excessively, however no adjustment is required in other cases.

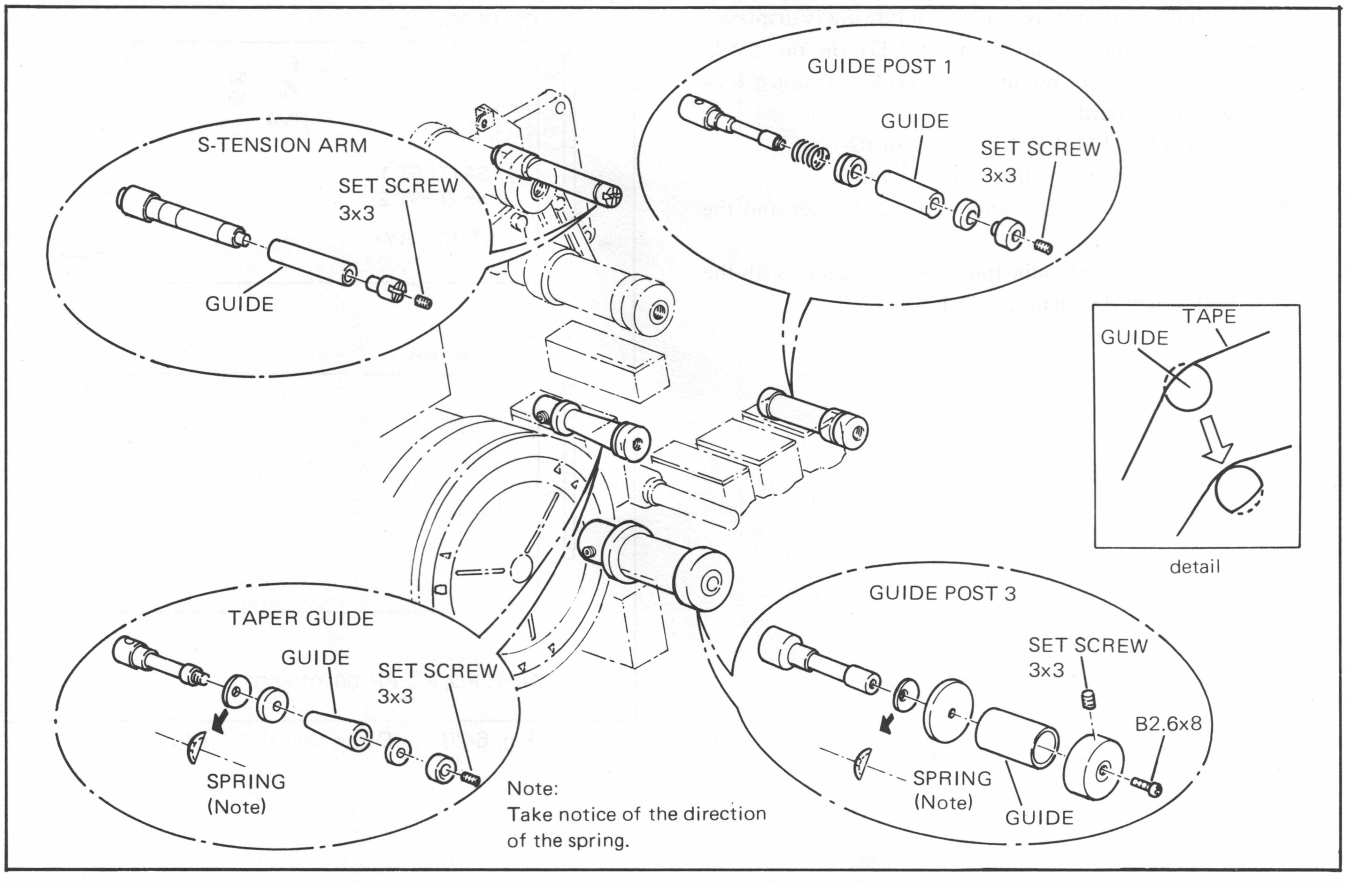


Fig. 6-21. Replacement of Guide Posts

6-6. REPLACEMENT OF SLANT GUIDE COMPONENTS

(For replacement, contact your SONY office.)

Preliminary Information

A. This section provides the replacement and adjustment procedures for the guide post, guide flange and entrance guide bracket of the entrance/exit slant guide assembly (see Fig. 6-23).

B. Prepare the guide flange fixture (inc. accessory screw and spacer) to replace the guide post and guide flange.
Guide flange fixture: Part No. J-6043-870-A.

Note: The spacer is neccessary for adjusting the machines installed type A exit slant guide assembly. Refer to section 3-8 for the type of exit slant guide assembly.

C. After replacement, perform the tape path adjustment in accordance with the flowchart shown in section 3-24-1.

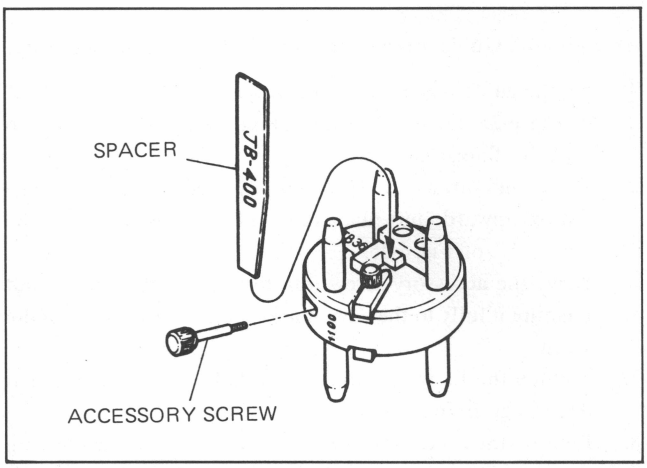


Fig. 6-22. Guide Flange Fixture

6-6-1. Replacement of Entrance Slant Guide Components

Removal

1. Turn off the power. When the slant guide is closed, turn the threading motor with a flat-blade screwdriver to open the slant guide.
2. Remove the two screws securing the entrance slant guide assembly.
When the fence is installed, remove it.
3. Remove the following parts (see Fig. 6-24).
   a. Loosen the screw ① and remove the compression spring.
   b. Remove the screws ② and ③ and take off the guide bracket.
   c. When replacing the guide post or guide flange, remove the flange fixing screw ④.
   d. Remove the two screws ⑤ and remove the guide post from the guide bracket.
   e. When replacing the guide bracket, remove the slant adjustment screw, steel ball and slant adjustment rod.

Note: When replacing the guide bracket only, go to step 9.

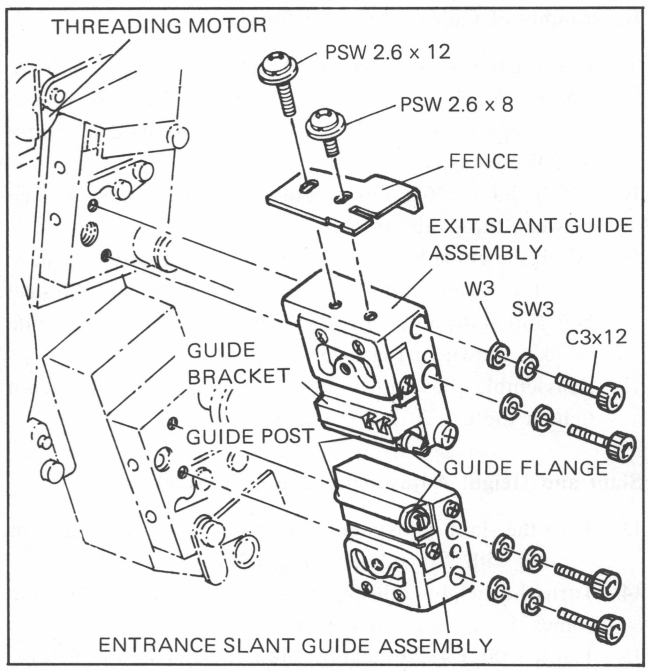


Fig. 6-23. Removal of Slant Guide Assembly

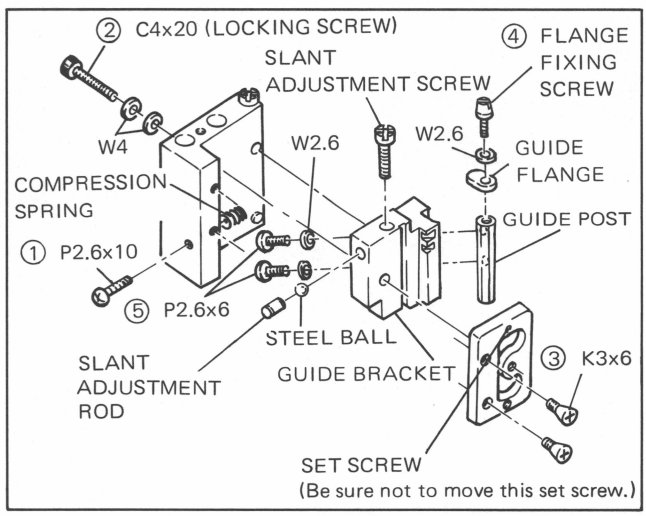


Fig. 6-24. Disassembly of Entrance Slant Guide

Assembly of Guide Flange and Guide Post (Entrance Side)

4. Set the guide post and the flange as shown in the detail "a" of Fig. 6-25, and tighten the flange fixing screw lightly so that the flange can move.
5. Place the surface marked with "S" of the guide flange fixture upward, and place the guide post as shown in the detail "b" of Fig. 6-25.
6. Drive the accessory screw into the side of the fixture and pushing it fully to the edge marked with "2000", tighten the screw.
7. Tighten the flange pushing screw lightly and then tighten the flange fixing screw firmly.
8. Remove the accessory screw and loosen the flange pushing screw and remove the guide post.

Reassembly of Guide (Entrance Side)

9. Pushing the guide post in the direction shown by the arrow (see Fig. 6-26), fix it to the guide bracket with two P2.6×6 screws applied with adhesive (such as locking compound) and W2.6 washers.
10. Check that the 0.03 mm thickness gauge cannot be inserted between the guide bracket and guide flange.
11. When the guide bracket has been replaced, drive the slant adjustment screw into the guide bracket, and put the steel ball and slant adjustment rod into the hole of the guide bracket shown in Fig. 6-26.
12. Reassemble the guide referring to Fig. 6-25, but do not tighten the C4×20 locking screw firmly.

Slant and Height Adjustment (Entrance Side)

13. Turn the slant adjustment screw so that the "B" side is in parallel with "A" side (see Fig. 6-27).
14. Turn the height adjustment screw so that the "D" side comes on the same plane with "C" side.
15. Tighten the C4×20 locking screw firmly (see Fig. 6-26).

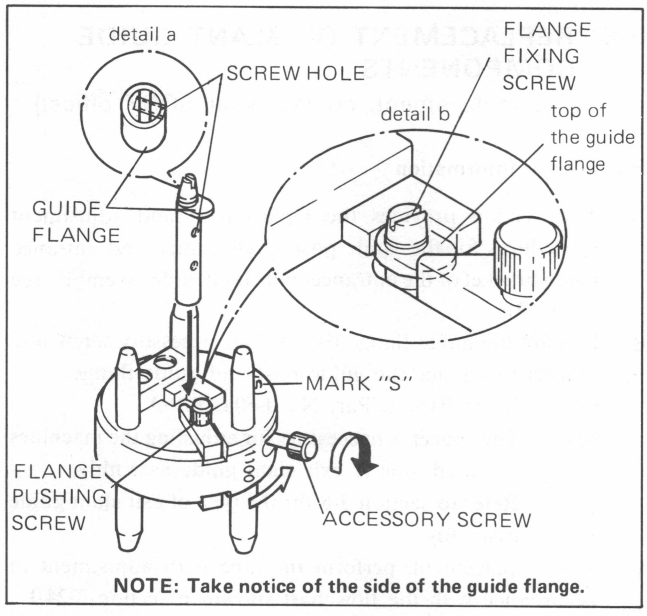


Fig. 6-25. Assembly of Entrance Guide Flange and Guide Post

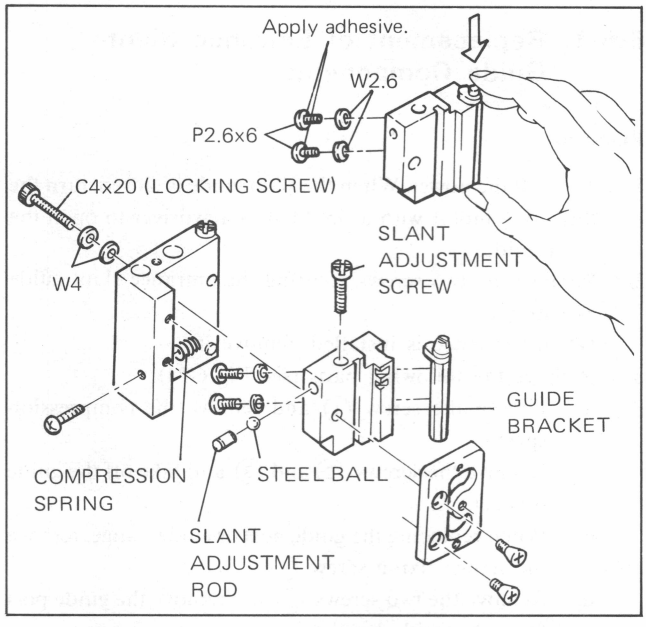


Fig. 6-26. Assembly of Entrance Slant Guide

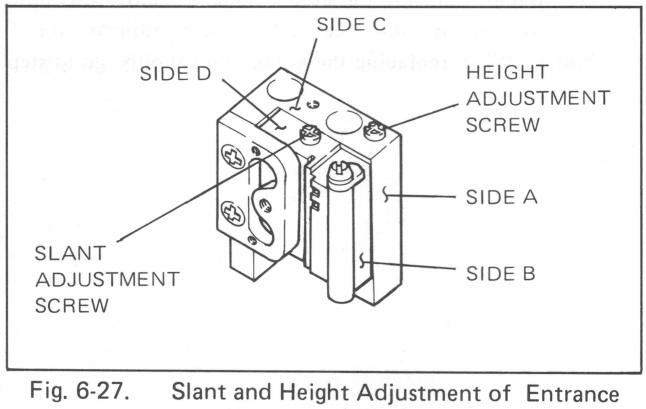


Fig. 6-27. Slant and Height Adjustment of Entrance Slant Guide

Installation of Entrance Slant Guide Assy

16. Clean the surface of the slide base on which the entrance slant guide assembly has been mounted, and the part of the lower drum in contact with the tape which was hidden by this assembly.
17. Loosen the set screw driven into the lower part of the taper guide by 3 turns.
18. Lightly fix the entrance slant guide assembly with two C3×12 screws, SW3 and W3 washers as far as possible away from the upper drum.
19. Turn the rotary head of the upper drum to keep apart from the slant guide and stop it. Turn the threading motor with a flat-blade screwdriver to close the slant guide.
    Note: Close the slant guide positively, checking that the guide post or guide bracket does not come into contact with the upper drum.
20. Insert a 0.1 mm thickness gauge between the guide bracket and the upper drum (see Fig. 6-28).
    Pressing the entrance slant guide assembly to come in contact with the three points indicated by ▲ in the figure, tighten the two C3×12 screws firmly.
21. When the fence had been installed, reinstall the fence and adjust the position as follows.
    ① While pushing the fence in the direction shown by arrow in Fig. 6-28 and also pushing it toward the lower drum so that the lower of the fence touches the cylinder of lower drum, and lightly fix the fence with two screws PSW 2.6 × 12 and PSW 2.6 × 8.
    ② Adjust the setscrew so that the clearance between the upper drum and the fence is 0.15 ± 0.05 mm. After adjustment, securely tighten the screws which were tightened loosely in the former step.
    ③ Confirm that the tip of the setscrew touches the entrance slant guide block, and glue the setscrew tightened in step 2 with adhesive like a retaining compound.

Check and Adjustment (Entrance Side)

22. Open the slant guide and insert a 1-inch video tape folded in two between the slant guide (incl. the guide flange) and the upper drum. After closing the slant guide, check that the tape moves smoothly.
23. Perform the tape path adjustment in accordance with the flowchart of section 3-24-1.

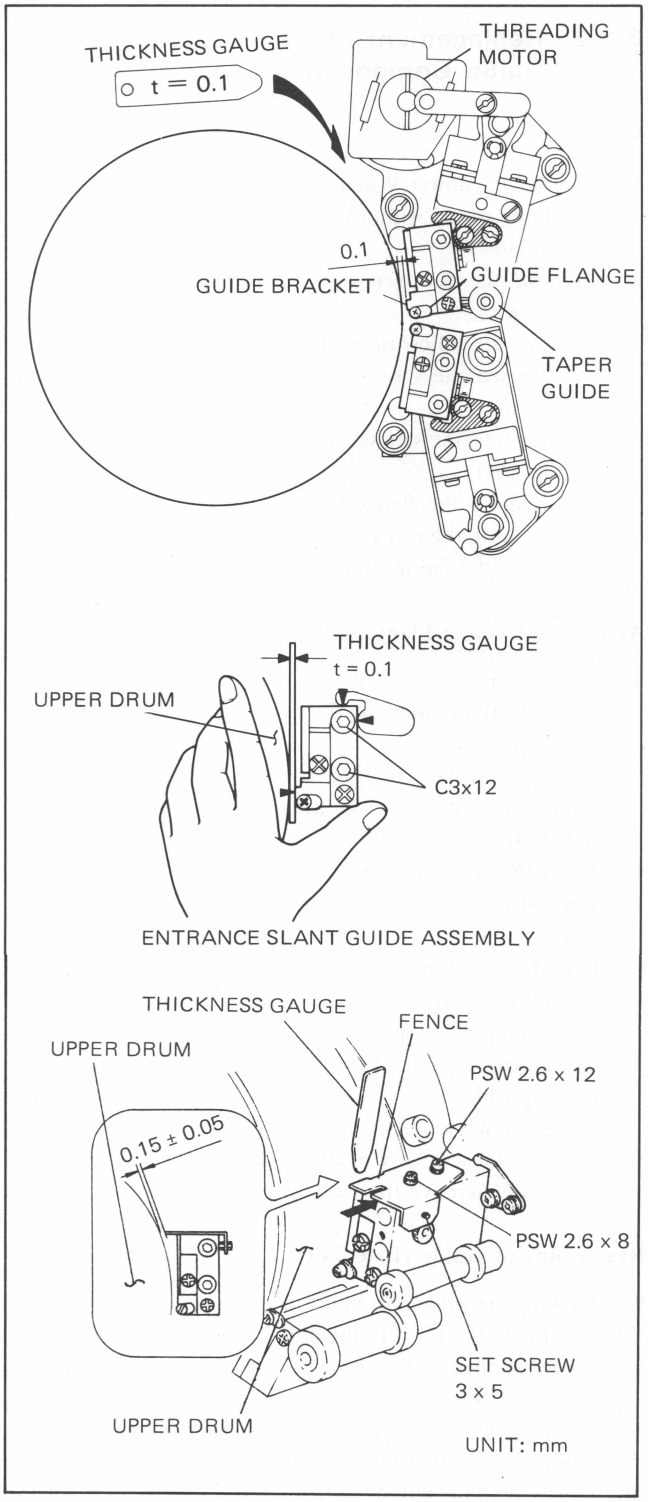


Fig. 6-28. Entrance Slant Guide Assembly Position Adjustment

6-6-2. Replacement of Exit Slant Guide Components

Removal

1. Turn off the power. When the slant guide is closed, turn the threading motor with a flat-blade screwdriver to open the slant guide.
2. Remove the two screws securing the exit slant guide assembly.
3. Remove the following parts (see Fig. 6-29).
   a. Loosen the screw ① and remove the compression spring.
   b. Remove the screws ② and ③ and take off the guide bracket.
   c. Remove the flange fixing screw ④ .
   d. Remove the two screws ⑤ and remove the guide post from the guide bracket.

Assembly of Guide Flange and Guide Post (Exit Side)

4. Set the guide post and flange as shown in the detail "a" of Fig. 6-30, and tighten the flange fixing screw lightly so that the flange can move.
5. Place the surface marked with "T" of the guide flange fixture upward, and place the guide post as shown in the detail "b" of Fig. 6-30.
6. Drive the accessory screw into the side of the fixture and pushing it fully to the edge marked with "2000", tighten the screw.
7. For the machines installed type A exit slant guide assembly, insert the accessory spacer between the guide flange and the stopper (Do not insert for the machines istalled type B exit slant guide assembly.), tighten the guide flange pushing screw by hand. And then tighten the flange fixing screw securely.
8. Remove the accessory screw and loosen the flange pushing screw and remove the guide post.

Reassembly of Guide (Exit Side)

9. Pushing the guide post in the direction shown by the arrow (see Fig. 6-31), fix it to the guide bracket with two P2.6×6 screws applied with adhesive (such as locking compound) and W2.6 washers.
10. Check that the 0.03 mm thickness gauge cannot be inserted between the guide bracket and guide flange.
11. Reassemble the guide referring to Fig. 6-29, but the C4×20 locking screw should not be tightened firmly.

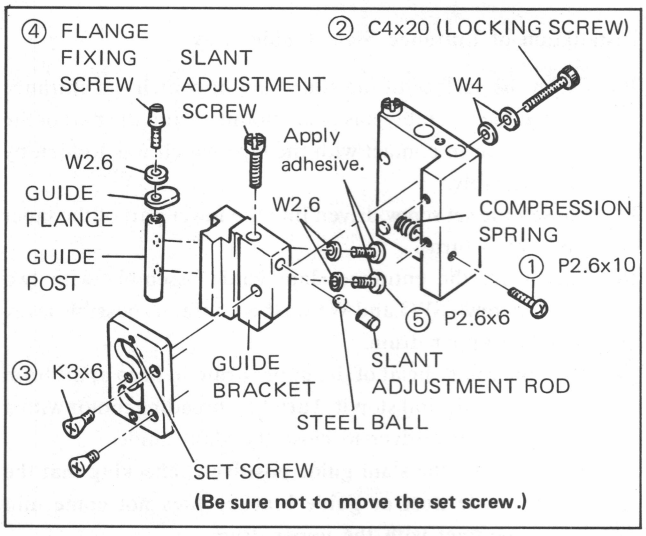


Fig. 6-29. Disassembly of Exit Slant Guide

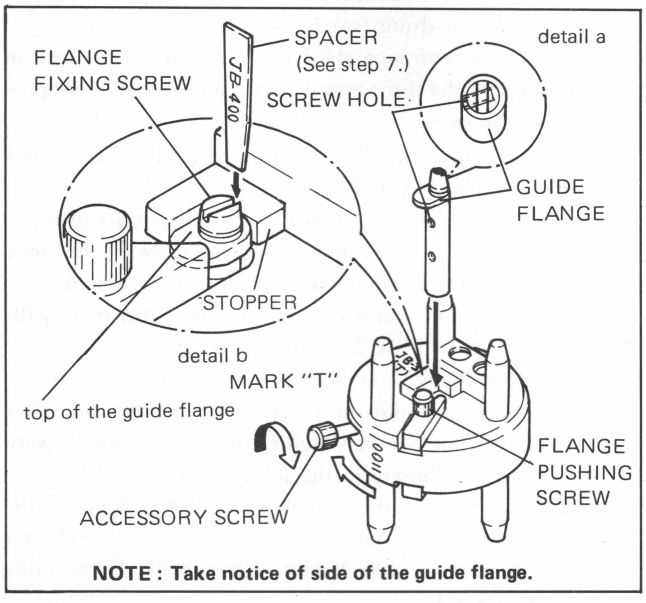


Fig. 6-30. Assembly of Exit Guide Flange and Guide Post

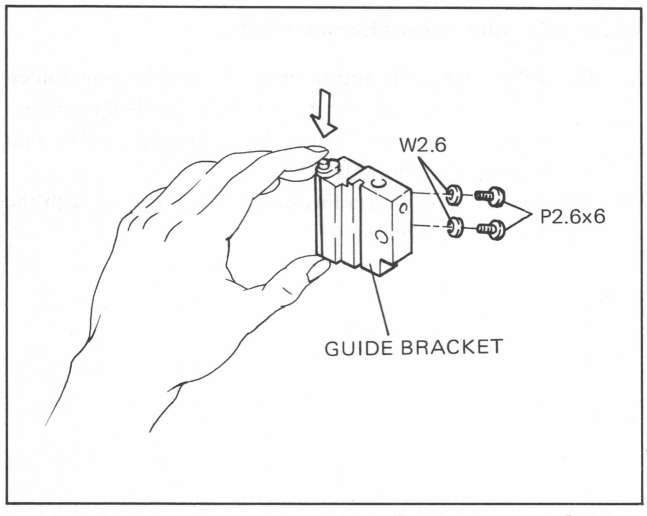


Fig. 6-31. Reassembly of Exit Guide Post and Guide Bracket

Slant and Height Adjustment (Exit Side)

12. Turn the slant adjustment screw so that the "B" side in parallel with "A" side (see Fig. 6-32).
13. Turn the height adjustment screw so that the "D" side comes on the same plane with "C" side.
14. Tighten the C4×20 locking screw firmly (see Fig. 6-29).

Installation of Exit Slant Guide Assy

15. Clean the surface of the slide base on which the exit slant guide assembly has been mounted, and the part of the lower drum in contact with the tape which was hidden by this assembly.
16. Loosen the set screw driven into the lower part of the guide post 3 (or guide roller 3) by 3 turns.
17. Lightly fix the exit slant guide assembly with two C3×12 screws, SW3 and W3 washers as far as possible away from the upper drum.
18. Turn the rotary head of the upper drum to keep apart from the slant guide and stop it. Turn the threading motor with a flat-blade screwdriver to close the slant guide.
    Note: Close the slant guide positively, checking that the guide post or guide bracket does not come into contact with the upper drum.
19. For the machines installed type A exit slant guide assembly, insert the thickness gauge of 0.09 mm in thichkness (0.25 mm for the machines istalled type B exit slant guide assembly) between the upper drum and the guide post as shown in Fig. 6-33.
    While pressing the exit slant guide assembly to come in contact with the three points indicated by ▲ in the figure, tighten the two C3X12 screws firmly.

Check and Adjustment (Exit Side)

20. Open the slant guide and insert a 1-inch video tape folded in two between the slant guide (incl. the guide flange) and the upper drum. After closing the slant guide, check that the tape moves smoothly.
21. Perform the tape path adjustment in accordance with the flowchart of section 3-24-1.

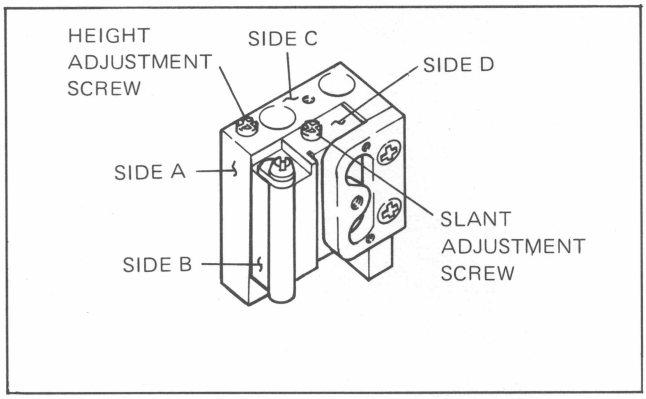


Fig. 6-32. Slant and Height Adjustment of Exit Slant

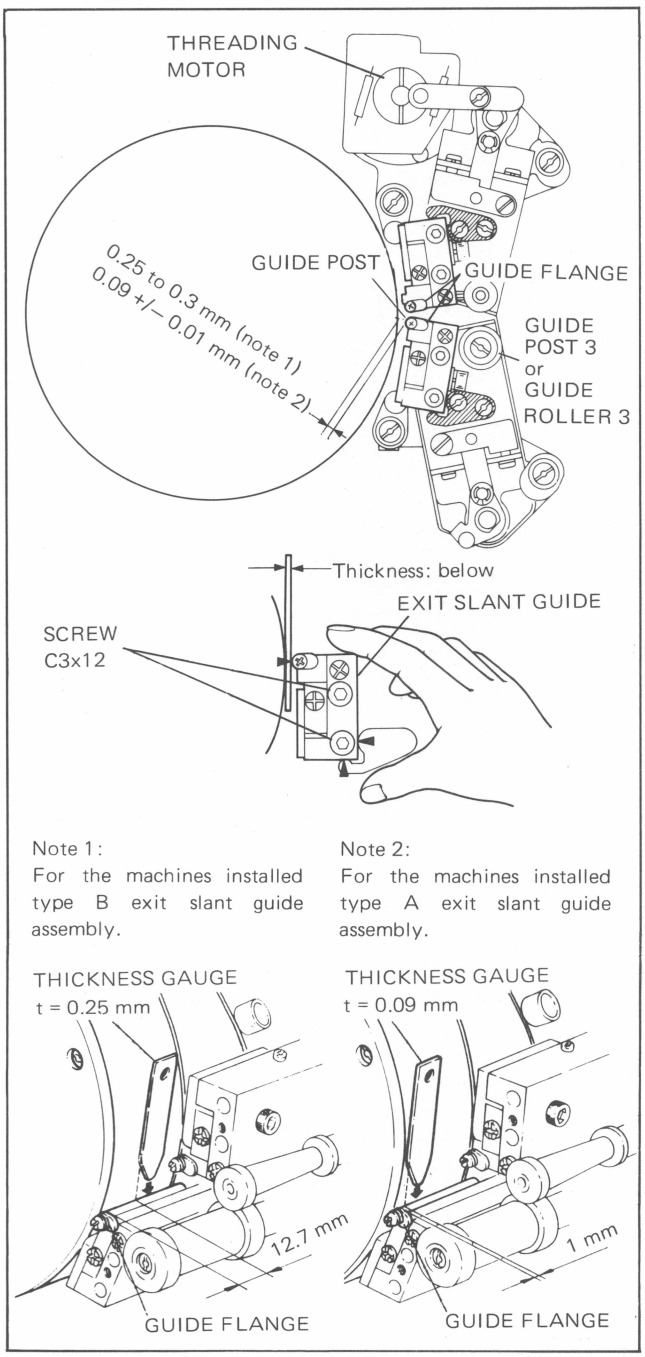


Fig. 6-33. Exit slant Guide Assembly Position Adjustment

SECTION 7
GENERAL INFORMATION FOR ALIGNMENT

7-1. INDEX OF ALIGNMENT COMPONENTS

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VP-15 Board (Board No.1-611-296-11,12)

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VP-15 Board (Board No.1-611-296-13 & up)

Section	Section
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RV7.....15-9-4	RV15....15-10
RV9.....15-6	RV16....15-9-5
RV10....15-3	RV17....15-9-5

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TD-07 Board (Board No.1-611-297-12 & UP)

Section	Section
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	Section		Section
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Section
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RA-05 Board

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TT-01 Board

Section	Section
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VV-01 Board

Section	Section
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FV-01 Board

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PS-14 Board

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VM-01 Board

Section	Section
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RV3.....13-3	RV6.....13-19

SECTION 8
PREPARATION FOR ALIGNMENT

8-1. EQUIPMENT REQUIRED

1. NTSC Test Signal Generator
TEKTRONIX Type 1410 or Equivalent

Test Signal Module	SYNC GENERATOR	SPG2
	COLOR BAR GEN.	TSG1
	PATTERN GEN.	TSP1
	LINEARITY GEN.	TSG3
	PULSE & BAR GEN.	TSG5
	MULTIBURST GEN.	TSG6

Refer to section 8-2 for signal details.

2. NTSC Test Signal Generator
TEKTRONIX Type 149A or Equivalent

3. NTSC Vectorscope
TEKTRONIX Type 520A or Equivalent

4. NTSC Waveform Monitor
TEKTRONIX Type 1480 or Equivalent

5. Spectrum Analyzer
HEWLETT PACKARD Type 141T or Equivalent
Note: The spectrum analyzer is necessary when performing the adjustment of section 13-14, 13-30-4 and 13-30-6.

6. Oscilloscope
TEKTRONIX Type 465B or Equivalent
Note: Section 15-29 can be adjusted by using an ordinary oscilloscope. However, when the digital storage oscilloscope TEKTRONIX Type 468 or equivalent is used, the adjustment can be performed more accurately.

7. Frequency Counter

8. Audio Distortion Analyzer
HEWLETT PACKARD Type 331A or Equivalent

9. Audio Oscillator
HEWLETT PACKARD Type 200CD or Equivalent

10. Digital Voltmeter
Effective digits; more than 4½ digits
Accuracy; less than 0.02% ±1 count

11. Attenuator
HEWLETT PACKARD Type 4436A or Equivalent

12. 1kHz & 15kHz Band-Pass Filter
Spec.: Q > 5
Attenuation = more than 12dB/OCT
S/N ratio = more than 70dB

13. Time Base corrector
SONY BVT-2000

14. Extender; EB-10 (Supplied with BVH-2500)
SONY Part No. A-6001-005-A

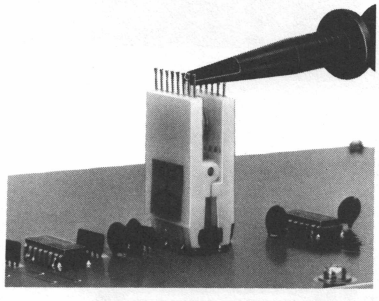
15. Tension Adjustment Tool
SONY Part No. J-6043-120-A

16. Alignment Tape; BR5-2
SONY Part No. 8-944-005-03

17. Empty Reel

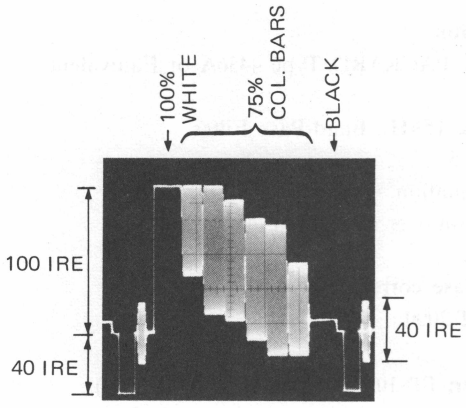
18. SONY 9" Full Wound Tape

19. IC Test Clip
Type TC-16: SONY Part No. J-6041-770-A
Type TC-20: SONY Part No. J-6041-780-A
Manufacturer;
AP PRODUCTS INCORPORATED
P.O.Box 697, 72 Corwin Drive
Peinesville, Ohio 44077, U.S.A.
Tel: (216) 354-2101
When connecting the test probe to the terminal of DIP integrated circuit, these clips are convenient. Type TC-16 is for DIP 14-pin or 16-pin IC and Type TC-20 is for 18-pin or 20-pin IC.

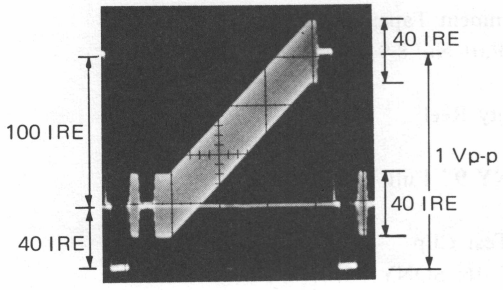


8-2. TEST SIGNALS

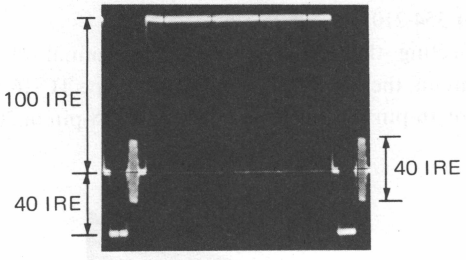
COLOR BARS



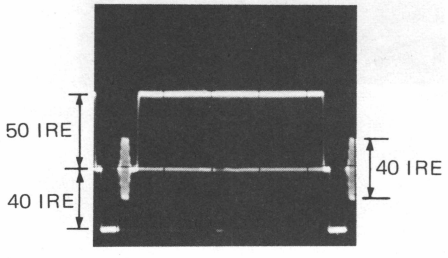
RAMP LINEARITY



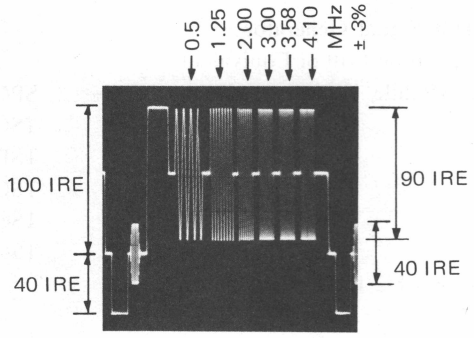
100% FLAT FIELD



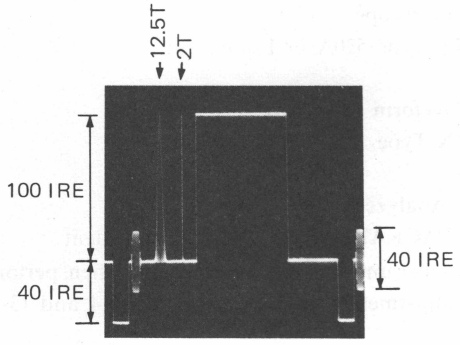
50% FLAT FIELD



MULTIBURST



PULSE & BAR



8-3. VITS SIGNAL INSERTION

TEK. 1410

See the TSP1 manual for details.

	LINE	SIGNAL
VIDEO CH	17	PULSE & BAR
	18	BLANK
	19	BLANK
	20	BLANK
	21	MULTIBURST

TEK. 149A

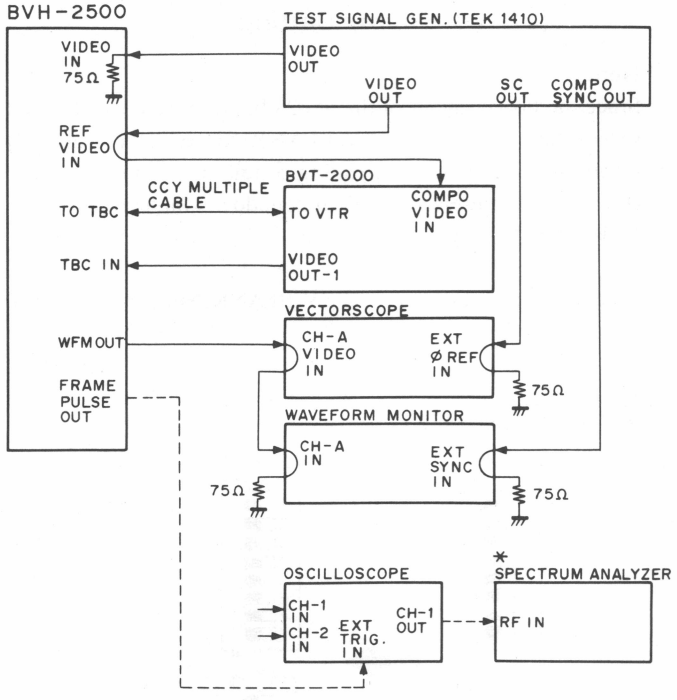
See the 149A manual for details.

	LINE	SIGNAL
SYNC CH	10	PULSE & BAR
	11	RAMP LINEARITY
	12	RAMP LINEARITY
	13	RAMP LINEARITY
	14	MULTIBURST
	15	COLOR BARS
	16	BLANK

When the 149A is used as the VITS inserter, do not make a programming on the VIDEO channel. If do so, the two signals will be added and inserted as a double amplitude VIT signal on the program line output.

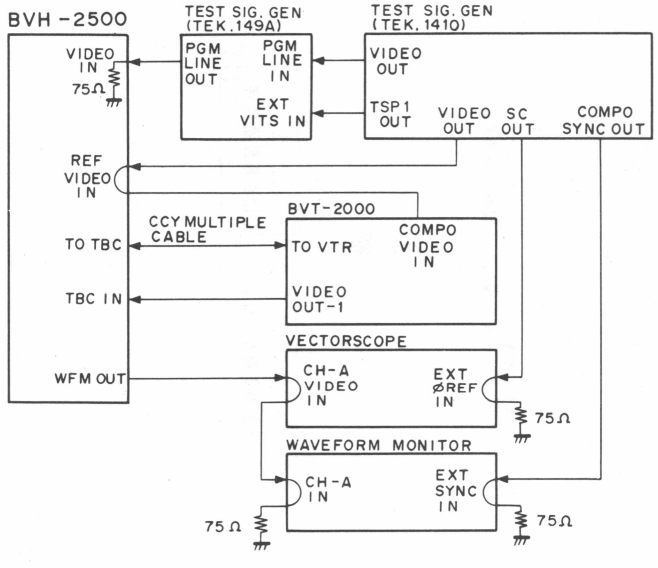
8-4. CONNECTIONS

CONNECTION 1.

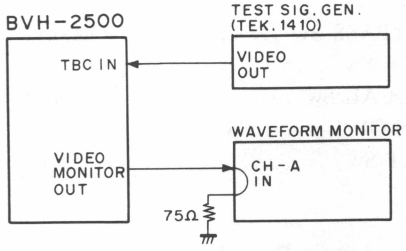


*** When performing the adjustment of section 13-14, 13-30-4 and 13-30-6, prepare the Spectrum Analyzer.**

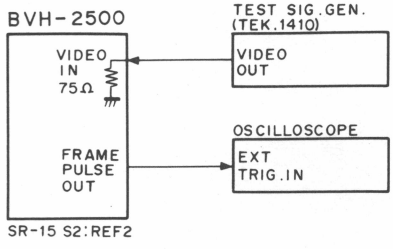
CONNECTION 2. (For sec. 13-31-2)



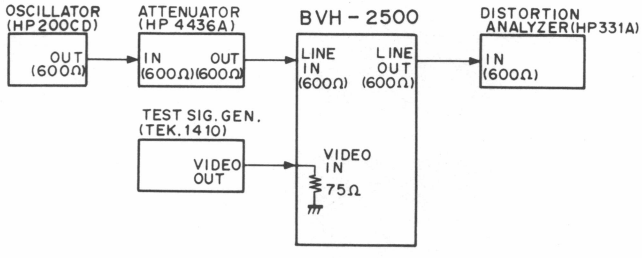
CONNECTION 3.



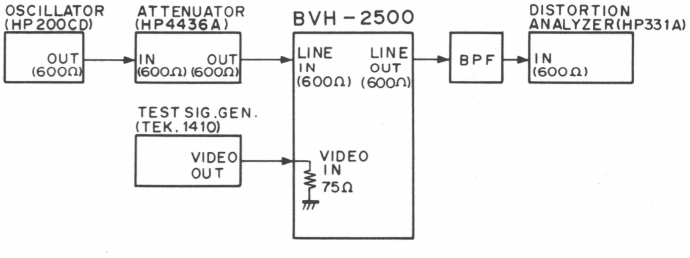
CONNECTION 4.



CONNECTION 5.



CONNECTION 6.



8-5. INITIAL SETTING OF THE BVT-2000

8-5-1. Control Panel

NORMAL/BYPASS Sw ..... NORMAL
CNR ON/OFF Sw ..... OFF
REMOTE/LOCAL Sw ..... LOCAL
DIRECT COLOR/U-matic Sw ..... DIRECT
Each PRESET Sw ..... PRESET

8-5-2. Connector Panel

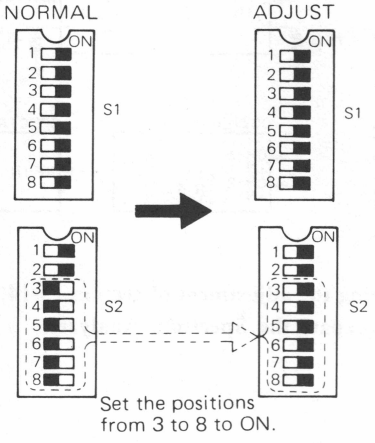
NON COMP/COMP Sw ..... COMP

8-5-3. V. BLANKING LINE SELECT Switch (SG-28 Board) Setting

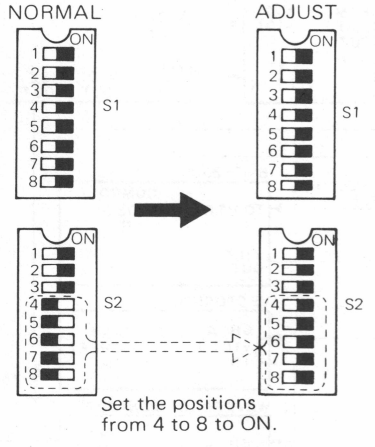
Note:
Since the board layout of the SG-28 board have been changed several times, therefore the V. BLANKING switch (S1 and S2) positions under normal operating condition are differed. After completion of the electrical alignment,do not forget resetting the V. BLANKING switches correctly.

Change the programming of the V. BLANKING LINE SELECT switch as follows.

SG-28 BOARD
BOARD NO. 1-600-163-11



SG-28 BOARD
BOARD NO. 1-600-163-12 or UP



8-6. Initial Setting of the BVH-2500

8-6-1. Level Control Panel

PICTURE MONITOR Sel.....DEMOD OUT
WAVEFORM MONITOR Sel.....SELECT VIDEO
REMOTE/LOCAL Sw.....LOCAL
AUDIO-1/2/3 REC Cont.....Push
AUDIO-1/2/3 PB Cont.....Push
VIDEO Level Cont.....Push
TRACKING Cont.....Push

8-6-2. Function Control Panel

TAPE/EE Sel.....TAPE/EE
SERVO REF Sel.....INPUT
R/P MODE Sel.....FRAME
TIME CODE/TIMER Sel.....TIMER-1

8-6-3. Card Rack Block

AE-03 Board
S1; A-3 Sel Sw.....LINE
S2; TC Input Sel Sw.....INT
JP1/2;REGEN/(PB/EE) Sel.....REGEN(JP1)

EQ-02 Board
S1; AUTO/MANU Sw.....AUTO
JP2/1;DO TTL/RF Sel.....TTL(JP2)
JP3; DROPOUT TEST.....SHORT

DM-25 Board
SW1; WHITE REF Sw.....OFF
SW2A-1 to 8;
INSERTION LINE Sel Sw.....ON

MD-22 Board
S1; METER Sel Sw.....INPUT
JP1/2;FREQ. COMPEN Sel.....JP2
JP3/4;PEAK/SYNC Sel.....SYNC(JP4)

DV-01 Board
S1; CF INHI Sw.....OFF

LM-10 Board (Board No. 1-611-295-11)
S1-1 .....ON
S1-2 .....ON
S1-3; MEMORY SELECT Sw.....OFF
S2; BURST ON/OFF Sw.....OFF
S3; WRITE ADRS. PRESET Sw.....8
S4; WRITE ADRS. PRESET Sw.....C
S5; WRITE ADRS. PRESET Sw.....1
S6; WRITE ADRS. 0 PRESET Sw...7
S7; WRITE ADRS. 0 PRESET Sw...E
S8; WRITE ADRS. 0 PRESET Sw...1
JP1 to 6;
W CK DELAY.....30nsec (JP4)

LM-10 Board (Board No. 1-611-295-12 & up)
S2; BURST ON/OFF Sw.....OFF
JP1 to 6;
W CK DELAY.....30nsec(JP4)

VP-15 Board (Board No. 1-611-296-11,12)
S1; TEST Sw.....OFF
S2; Δø/DTV Sw.....OFF
S3 .....ON
S4; TEST Sw.....OFF
S5; TEST Sw.....ON
JP1/2 .....JP2
JP3/4 .....JP4
JP6/7 .....JP7

VP-15 Board (Board No. 1-611-296-13 & up)
S1; TEST Sw.....OFF
S2; Δø/DTV Sw.....OFF
S4; TEST Sw.....OFF
S5; TEST Sw.....ON
S6; TEST Sw.....OFF

TD-07 Board
S1-1; ROM DATA SELECT Sw.....OFF
S1-2; ROM DATA SELECT Sw.....OFF
S1-3 .....ON
S1-4; GAIN ADJ Sw.....OFF
S1-5; HC Sw.....OFF
S1-6; TEST Sw.....OFF
S1-7 .....ON
S2; ADJ/NORM Sw.....ON
S3; MANU SHIFT Sw.....OFF

LG-04 Board
S1-1; V/S SIMUL Sw.....ON
S1-2; TC INS INHIBIT Sw.....OFF
S2-1; REEL MODE SHUTTLE Sw.....OFF
S2-2; DELAY ENABLE Sw.....OFF
S2-3; PLAY/REC EOT INHIBIT Sw...OFF
S2-4; LEVER SW ENABLE Sw.....OFF
S2-5; AUDIO REC ENABLE Sw.....OFF
S2-6; TC SENSE MODE SELECT Sw...OFF
S2-7; Δt BUZZER DISABLE Sw.....OFF
S2-8; Δt PARA REMOTE Sw.....OFF
S3; PLAY MODE Sel Sw.....1.5HD
S4; REC INHIBIT Sw.....Depends on each sections
S5; Δt DIR ENABLE Sw.....OFF
S6; EE/PB MULTI Sw.....Free
JP1; CONFI TEST.....OPEN
JP2; OSC CONT TEST.....OPEN
JP3 .....OPEN
JP4 .....OPEN
JP5; NORMAL FWD TEST.....OPEN
JP6; VID REC OFF TEST.....OPEN
JP7; VID TEST.....OPEN
JP12/13;A4 SEL.....JP12
JP14/15;MODEL SEL.....NTSC (JP15)

TC-14 Board

S1; READER Sw.....TC
S2; TC GEN. MODE Sw.....Free
S3; TC/UB MODE Sw.....TC
S4; PRESET/REGEN Sw.....PRESET
S5; TC/UB MODE Sw.....TC
S6; VITC Sw.....ON
S7; CHARACTER Sw.....ON
S8-1; SLTC Sw.....ON
S8-2; OUDS Sw.....OFF
S8-3; PARITY Sw.....ON
S8-4; FORMAT SELECT Sw.....OFF
S8-5; FORMAT SELECT Sw.....OFF
S8-6; VITC FIELD POSITION Sw....ON
S8-7; VITC FIELD POSITION Sw....OFF
S8-8; VITC FIELD POSITION Sw....ON
S9; VITC INSERT POSITION Sw...2
S10; VITC INSERT POSITION Sw...4
S11; CHARACTER SIZE Sw.....0 or 1
S12; CHARA V POSITION Sw.....Depends on usage
S13-1;B & W/BLACK Sw.....Depends on usage
S13-2;B & W/W & B Sw.....Depends on usage
S13-3;ALDSP Sw.....Depends on usage
S13-4;BYPASS Sw.....Depends on usage
SP1; BYPASS ENABLE.....OPEN

TC-14A Board

S1; READER Sw.....TC
S2; TC GEN. MODE Sw.....Free
S3; TC/UB MODE Sw.....TC
S4; PRESET/REGEN Sw.....PRESET
S5; TC/UB MODE Sw.....TC
S6; VITC Sw.....ON
S7; CHARACTER Sw.....ON
S8-1; N1 Sw.....OFF
S8-2; N2 Sw.....OFF
S8-2; SP1 Sw.....OFF
S8-4; CF Sw.....OFF
S8-5; CF BIT Sw.....OFF
S8-6; LTC CORRECTION Sw.....OFF
S8-7; LTC ERROR BYPASS Sw.....OFF
S8-8; CHARACTER+VITC CONT Sw....OFF
S9; VITC INSERT POSITION Sw...2
S10; VITC INSERT POSITION Sw...4
S11; CHARACTER SIZE Sw.....0 or 1
S12; CHARA V POSITION Sw.....Depends on usage
S13; CHARACTER MODE Sw.....Depends on usage
JP1; BINARY GROUP FLAG A.....SHORT
JP2; BINARY GROUP FLAG B.....SHORT
JP3; CHARA+VITC CONT ENABLE....SHORT
JP4A/4B.....JP4B
JP5 .....OPEN

SY-79 Board

S1; REACTION TIME Sw.....0
S2; PREROLL TIME Sw.....7
S3; TEST Sw.....Used for testing
S4; PARA RUN Sw.....OFF
S5; VAR Sw.....P JOG
S6; REMOTE Sw.....2
S9-2; FREE RUN Sw.....OFF
S9-3; .....OFF
S9-4; FUNCTION KEY ENABLE Sw....OFF
S9-5; FUNCTION STOP ENABLE Sw...OFF
S9-6; STILL OFF ENABLE Sw.....ON
S9-7; TENSION OFF ENABLE Sw.....ON
S9-8; STANDBY OFF ENABLE Sw.....ON
JP1 .....OPEN
JP2 .....SHORT

(SY-79)

JP3 .....OPEN
JP4 .....SHORT
JP5 .....OPEN
JP6 .....SHORT

SY-80 Board

S1; TEST/UPPER Sw.....Free
S2; STEP n Sw.....Free
S3; RESET Sw.....Used for testing
S4; TEST Sw.....Used for testing
S5; EOT STOP Sw.....ON
S6; EDIT TIMING Sw.....F1/F2
S7; DROP FRAME Sw.....ON
S8-1; FREE RUN Sw.....OFF
S8-4 .....OFF
S8-5; BVB Sw.....OFF
S8-7; EXT DF/CF CONTROL EN Sw...OFF
S8-8; OPERATION GUIDE Sw.....OFF
S9-1; REC CONFI OFF Sw.....OFF
S9-2; AUDIO EDIT Sw.....OFF
S9-3; EE MODE Sw.....OFF
S9-4; PREROLL MODE Sw.....OFF (+/-12H)
S9-5; DISPLAY MODE Sw.....Depends on usage
S9-6; IN POINT SYNCHRO Sw.....OFF
S9-7; SYNCHRO OFF Sw.....OFF
S9-8; TEST DISPLAY Sw.....OFF

SV-43 Board

S1-1; FREE RUN Sw.....OFF
S1-2; HARD CPU DIRECT ACCESS INHIBIT Sw.....OFF
S1-3 .....OFF
S1-4 .....OFF
S2; TAPE RUN Sw.....NORM

RL-12 Board

S1; SKEW Sw.....AUTO

CD-17 Board

S1; ADV Sw.....BVT
S2; CAP LOCK Sw.....2F
S3-1; CF LOCK MODE.....OFF
S3-2; AUTO PG ON/OFF Sw.....ON
S3-3 .....ON
S3-4; TIMER CTL COMP Sw.....ON
S3-5; PG PHASE PRESET Sw.....Depends on adjustment
S3-6; PG PHASE PRESET Sw.....Depends on adjustment
S3-7; AUTO SKEW ON/OFF Sw.....ON
S3-8; TRACKING SHIFT Sw.....OFF
S4; TEST-1 Sw.....0
S5; TEST-2 Sw.....0
S6; TEST-3 Sw.....0
S7; ENTRY Sw.....Used for testing
S8; ADV PRESET Sw.....8H

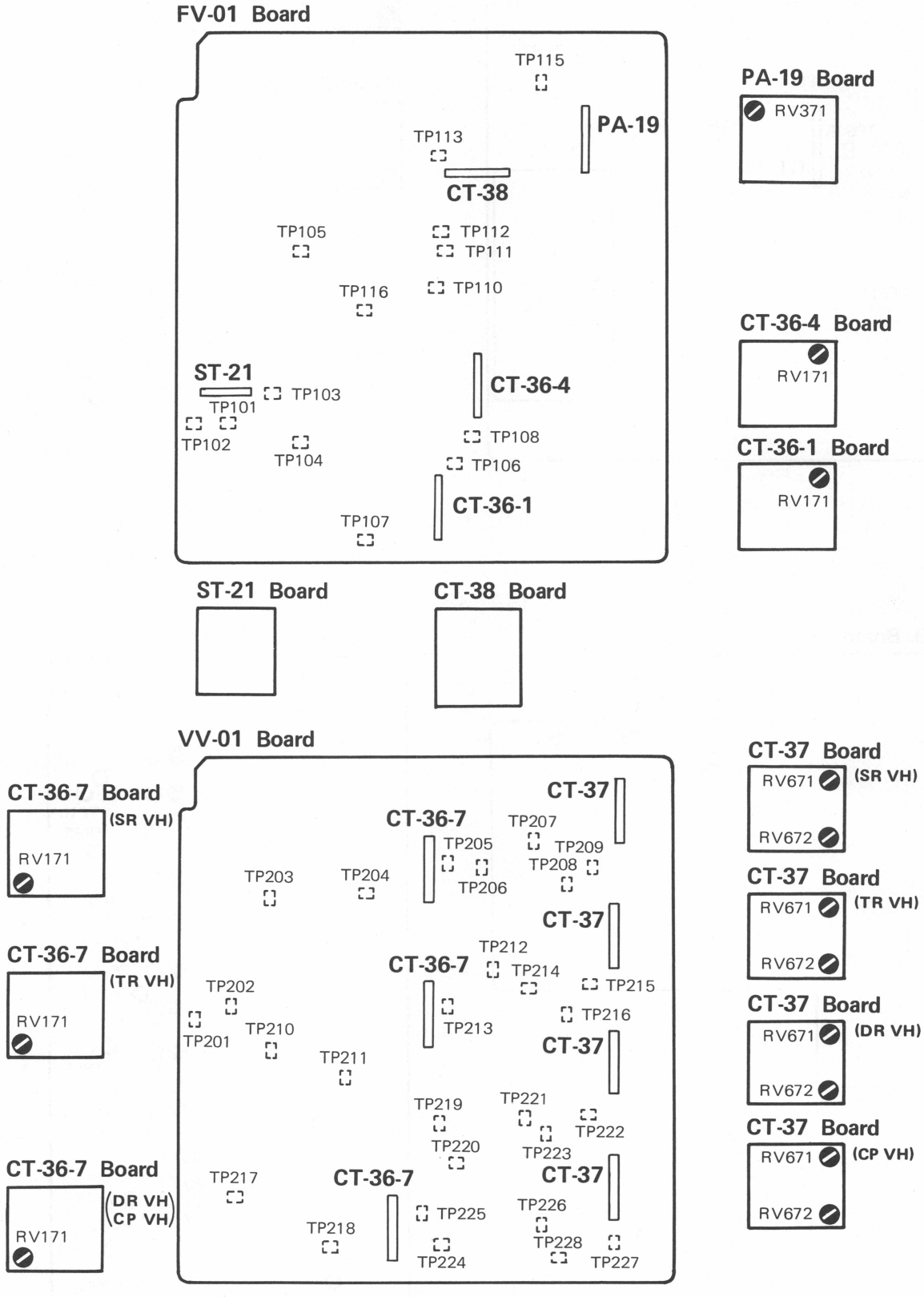
SR-15 Board

S1; CF SC ADJ Sw.....FIX
S2; PULSE OUT Sw.....REF 4

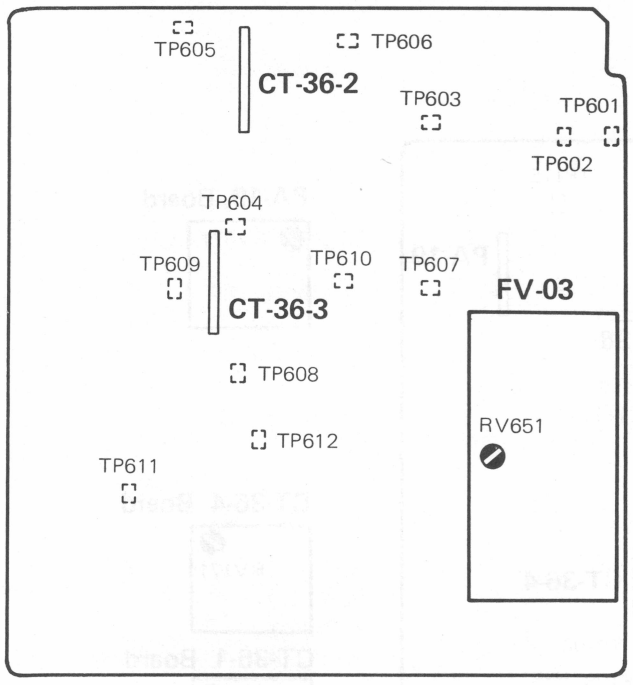
DT-04 Board

S1-1 .....OFF
S1-2 .....ON
S1-3 .....ON
S1-4 .....OFF
S2; REM/FIELD/FRAME Sw.....FIELD
S3 .....OFF
S4 .....OFF

SECTION 9
POWER SUPPLY ALIGNMENT



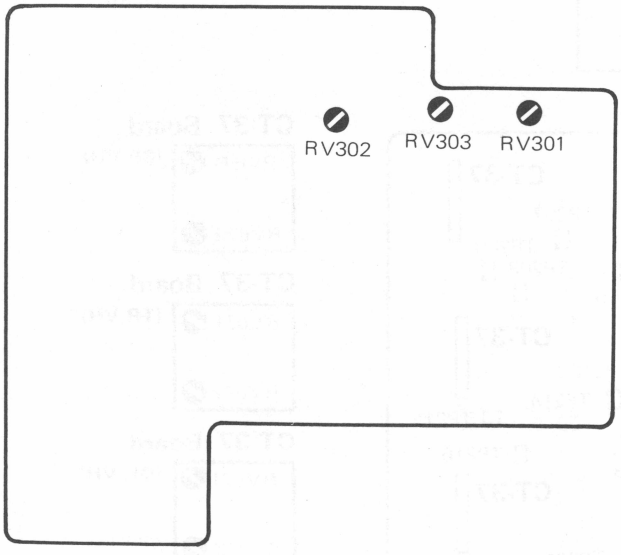
FV-02 Board



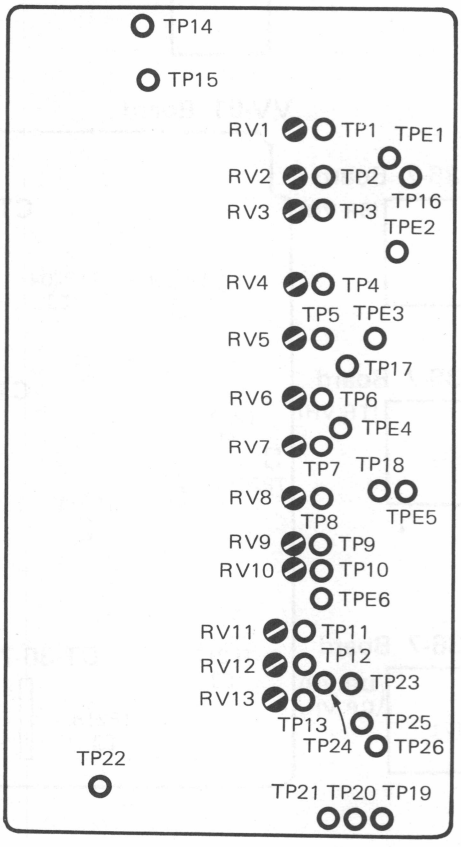
CT-36-2 Board

CT-36-3 Board

AC-39 Board



PS-14 Board



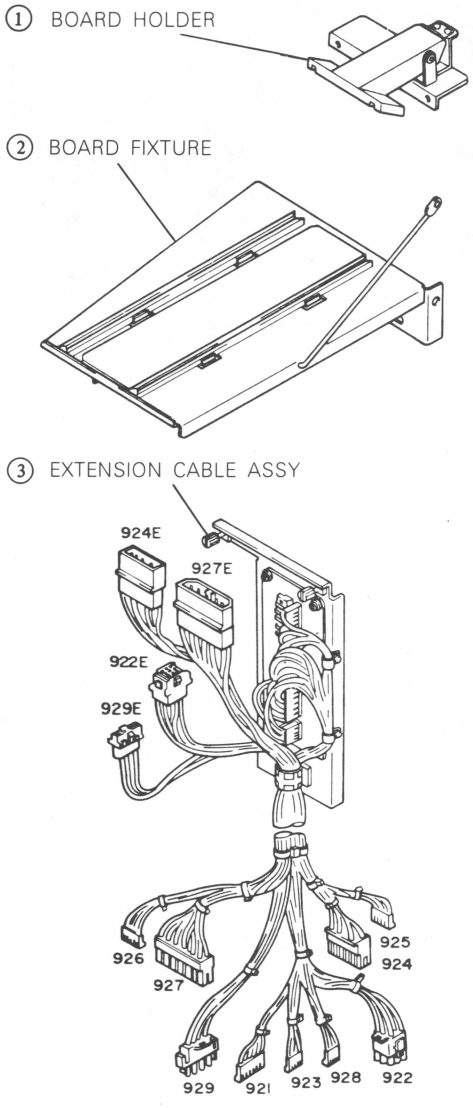
CAUTION: Before starting to perform the check and adjustment of the power supply, read section 4-3 "Notes on Power Unit".

9-1. SWITCHING REGULATOR OPERATING CHECK AND ADJUSTMENT

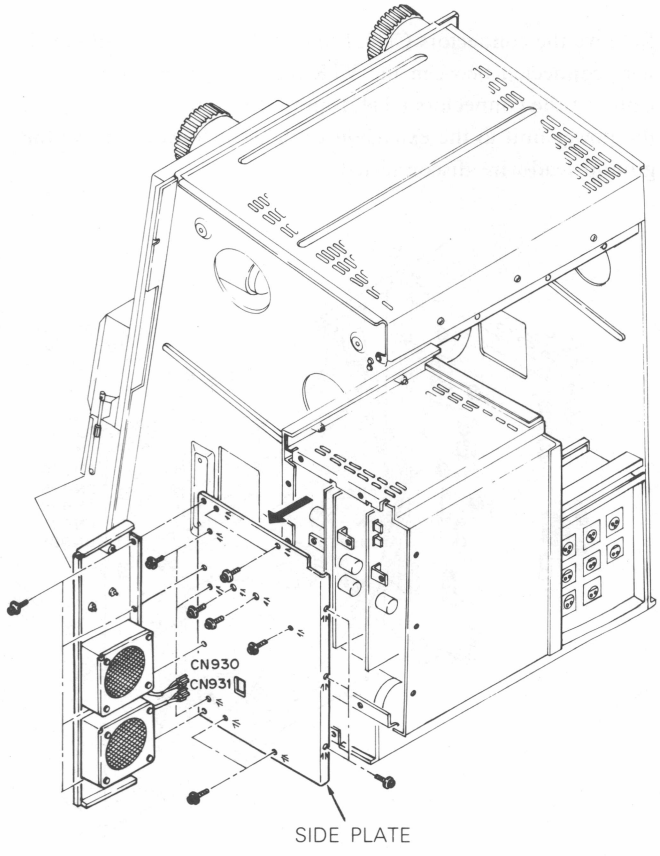
When performing the operating check and adjustment for the FV-01, VV-01, FV-02 and AC-39 boards, use the switching regulator adjustment fixture (Sony Part No. J-6043-640-A).
Since a high voltage and "live" current still remain in some parts and circuit of the power unit after the power switch is turned off, the fixture installation and removal must be performed after removing the power cord and passing five minutes or more.

9-1-1. Switching Regulator Adjustment Fixture Installation

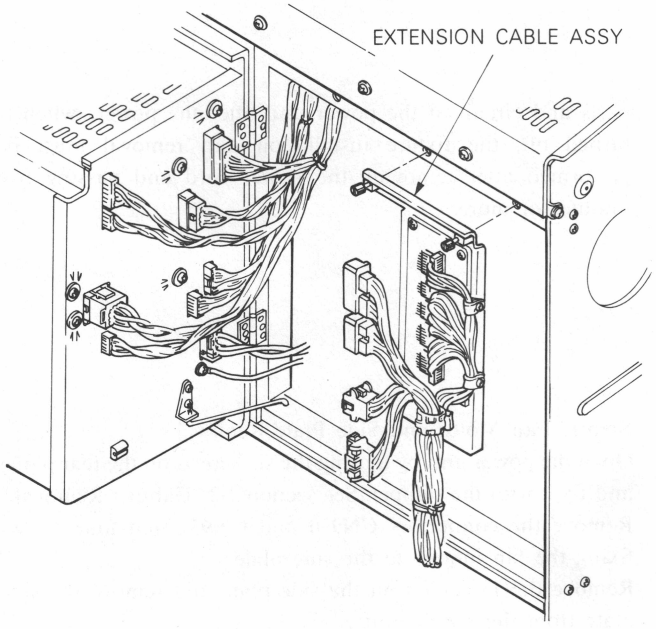
The switching regulator adjustment fixture is composed of the following three parts.
When performing the AC-39 board check and adjustment, use ③ Extension Cable Assy only.



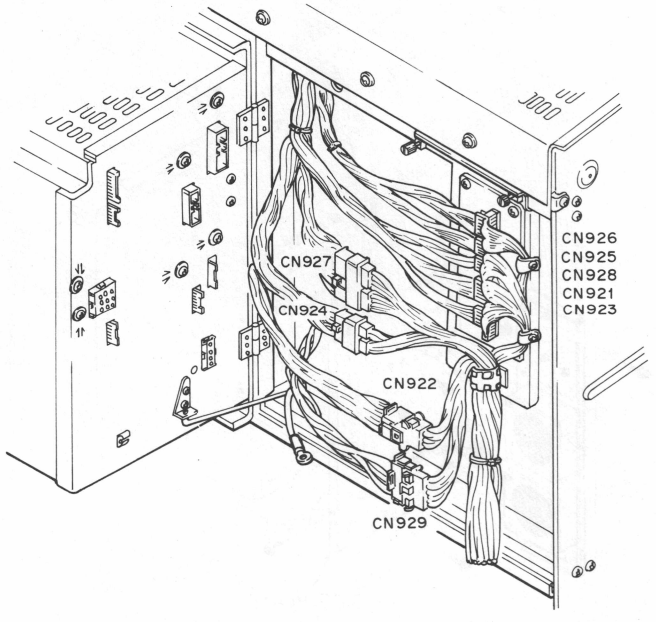
Step 1. Fan Motor and Side Plate Removal
Open the power unit by loosing the six screws on the rear panel and fix it with the stopper. See section 4-2 "Cabinet Removal".
Remove the connectors CN930 and CN931 and four screws fixing the fan motors to the side plate.
Remove the 13 screws on the side plate and remove the side plate from the power unit.



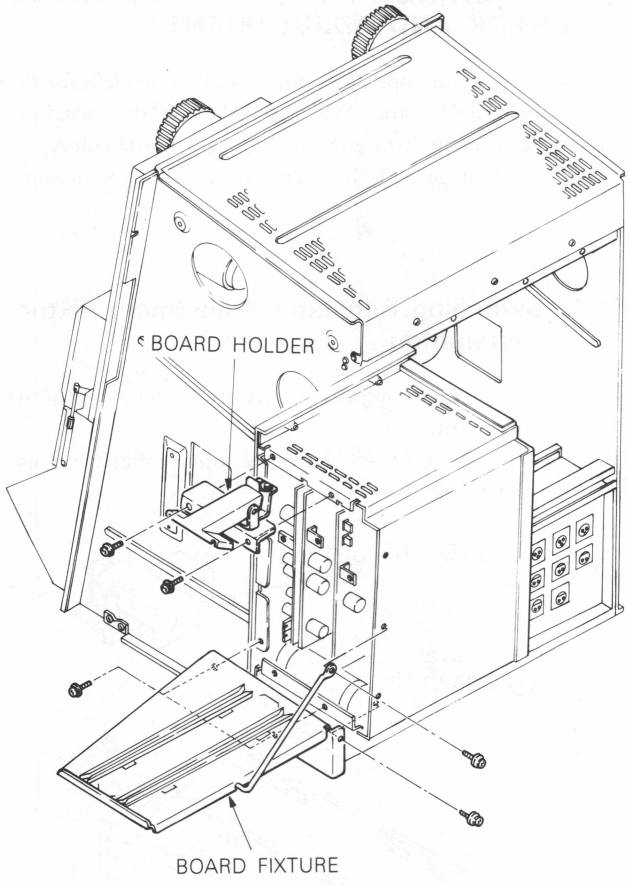
Step 2. Extension Cable Assy Installation
Install the extension cable assy on the VTR.



Remove the connectors CN921 to CN929 and the ground lead-wire connected between the VTR and the power unit.
Connect the connectors CN921 and CN929 disconnected from the power unit to the extension cable assy, however, leave the ground lead-wire disconnected.



Step 3. Board Fixture and Board Holder Installation
Install the board fixture and board holder on the power unit with screws removed at step 1.



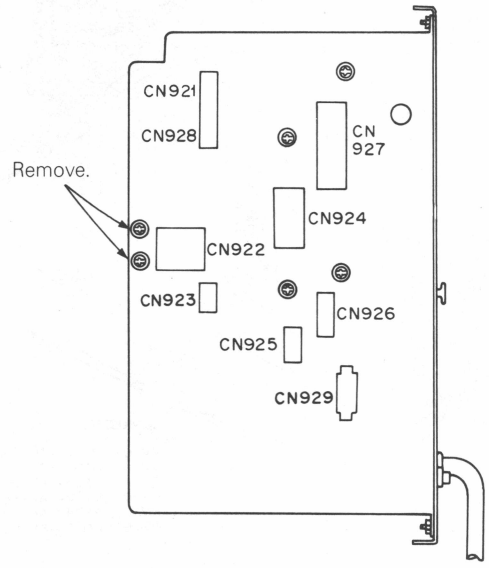
9-1-2. Board Settings

Caution: To prevent electric shock hazard from the primary circuit, the following procedures must be performed after disconnecting the power cord and passing five minutes or more.

1. FV-01 Board Setting

Step 1.
Install the switching regulator adjustment fixture.
See section 9-1-1.

Step 2.
Remove the two screws securing the FV-01 board as follows.

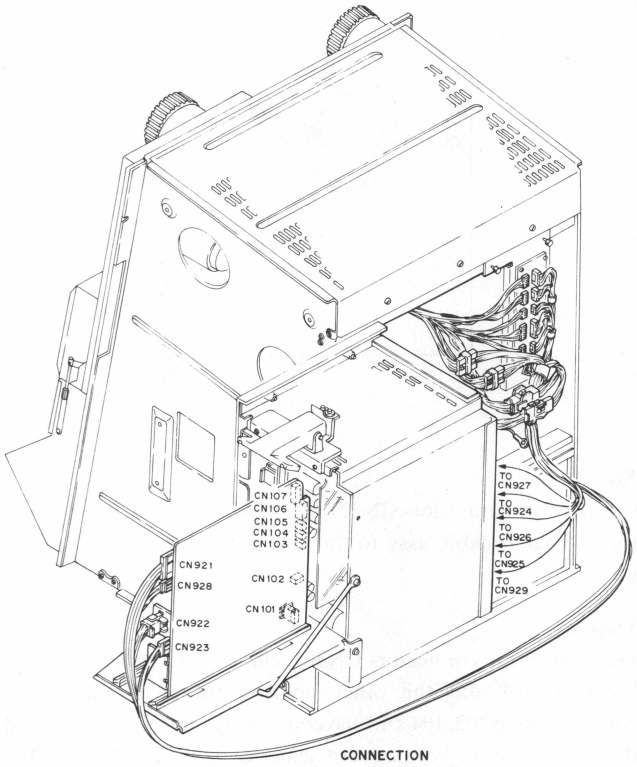


Step 3.
Connect the connectors CN924, 925, 926, 927 and 929 of the extension cable assy to the corresponding connectors on the power unit.

Step 4.
Remove the connectors CN101 to CN107 connecting the FV-01 board and the other boards and pull out the FV-01 board from the power unit.
Turn the FV-01 board 180° and insert it into the guide rail of the board fixture and fix it with the board holder.

Step 5.
Connect the connectors CN101 to CN107 removed at step 4 to the proper positions on the FV-01 board.

Step 6.
Connect the connectors CN921, 922, 923 and 929 of the extension cable assy to the corresponding connectors on the FV-01 board.



CONNECTION
FV-01, CN101 ↔ AC-39, CN307
FV-01, CN102 ↔ AC-39, CN305
FV-01, CN103 ↔ CN-54, CN470
FV-01, CN104 ↔ AC-39, CN311
FV-01, CN105 ↔ FC-02, CN603
FV-01, CN106 ↔ FC-02, CN602
FV-01, CN107 ↔ VV-01, CN202, 203

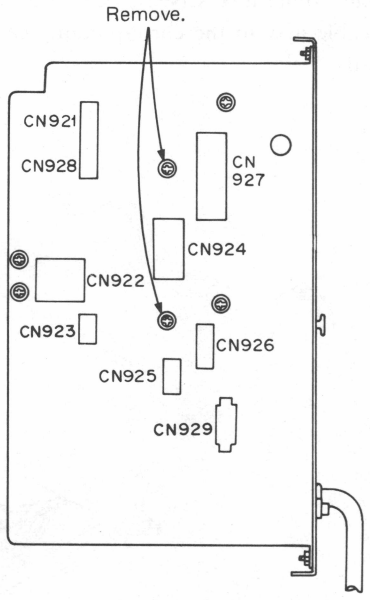
Step 7.
Turn the power on and perform the FV-01 board operating check and adjustment. The work must be performed in a short time.

Step 8.
After performing the operating check and adjustment, turn the power off and disconnect the power cord.
After passing five minutes or more, reinstall the FV-01 board to the power unit in reverse order of the above steps.

2. VV-01 Board Setting

Step 1.
Install the switching regulator adjustment fixture.
See section 9-1-1.

Step 2.
Remove the two screws securing the VV-01 board as follows.

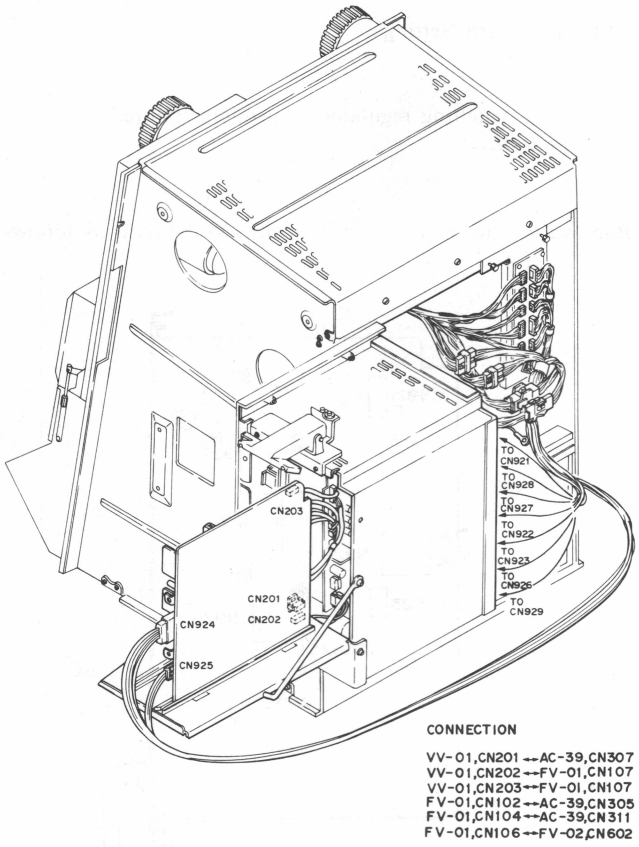


Step 3.
Connect the connectors CN921, 922, 923, 926, 927, 928 and 929 of the extension cable assy to the connector panel of the power unit.

Step 4.
Disconnect the connectors CN201, 202 and 203 connecting the VV-01 board and the other boards and also remove the connectors CN102, 104 and 106 connecting the FV-01 board and the other boards because the leads of CN102, 104 and 106 obstruct the VV-01 board removal.
After pulling the VV-01 board from the power unit, turn the VV-01 board 180° and insert it into the guide rail of the board fixture and fix it with the board holder.

Step 5.
Connect the connectors CN102, 104, 106, 201, 202 and 203 removed at step 4 to the proper positions on the FV-01 and VV-01 boards.

Step 6.
Connect the connectors CN924 and 925 of the extension cable assy to the corresponding connectors on the VV-01 board.



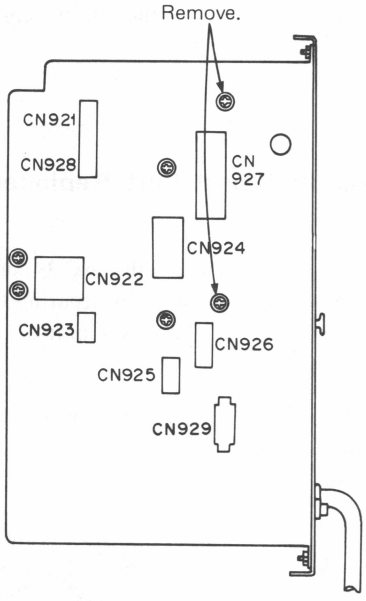
Step 7.
Turn on the power and perform the VV-01 board operation check and adjustment. The work must be performed in a short time.

Step 8.
After performing the operation check and adjustment, turn the power off and disconnect the power cord.
After passing five minutes or more, reinstall the VV-01 board to the power unit in reverse order of the above steps.

3. FV-02 Board Setting

Step 1.
Install the switching regulator adjustment fixture.
See section 9-1-1.

Step 2.
Remove two screws securing the FV-02 board as follows.

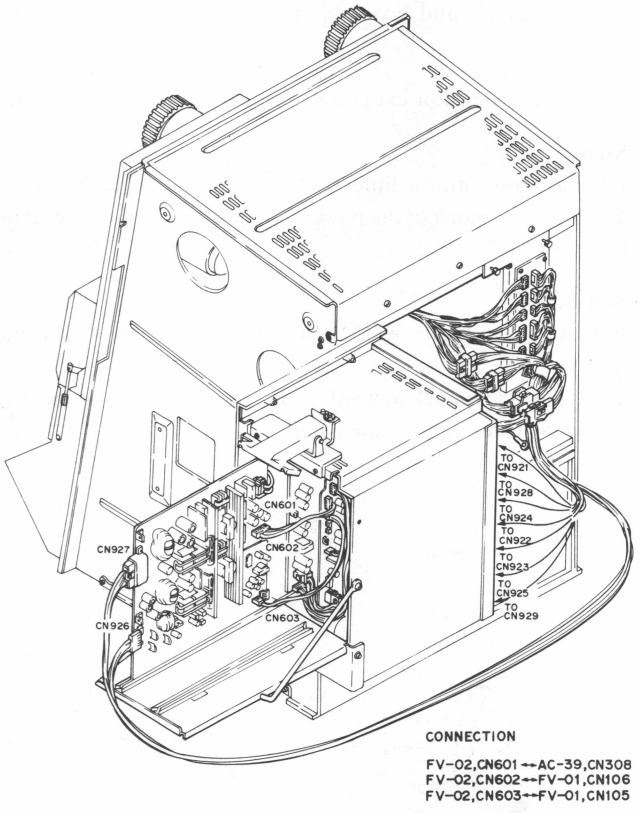


Step 3.
Connect the connectors CN921, 922, 923, 924, 925, 928 and 929 of the extension cable assy to the connector panel of the power unit.

Step 4.
Disconnect the connectors CN601, 602 and 603 connecting the FV-02 board and the other boards and pull the FV-02 board from the power unit.
Turn the FV-02 board 180° and insert it into the guide rail of the board fixture and fix it with the board holder.

Step 5.
Connect the connectors CN601, 602 and 603 removed at step 4 to the proper positions on the FV-02 board.

Stpe 6.
Connect the connectors CN926 and 927 of the extension cable assy to the corresponding connectors on the FV-02 board.



Step 7.
With power on, perform the FV-02 board operation check and adjustment. The work must be performed in a short time.

Step 8.
After performing the operation check and adjustment, turn the power off and diconnect the power cord.
After passing five minutes or more, reinstall the FV-02 board to the power unit in reverse order of the above steps.

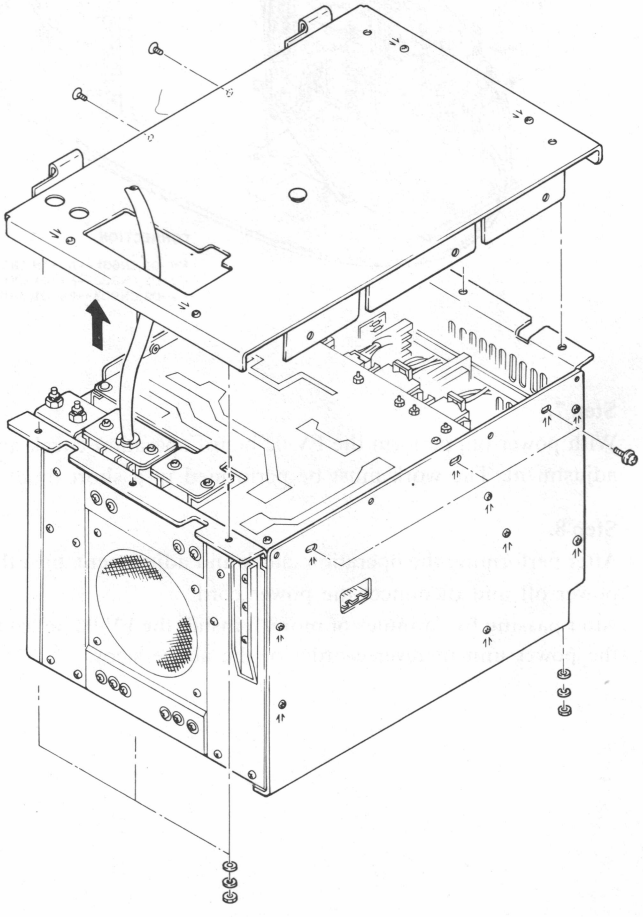
4. AC-39 Board Setting

Caution: When performing the AC-39 board operation check and adjustment, leave the side plate of the power unit installed.
When the switching regulator adjustment fixture is already installed to the power unit, remove the board fixture and board holder.

Step 1.
Install the extension cable assy. See step 2 of section 9-1-1.

Step 2.
Lift the power unit a little and remove it from the VTR.
Turn the rear panel of the power unit downward and place it on the work table.

Step 3.
Remove the six nuts, washers and spring washers with a nut driver.
Turn the rear panel upward and remove the remaining five screws to take off the rear panel.



Step 4.
Connect all the connectors CN921 to CN929 of the extension cable assy to the proper connectors on the connector panel of the power unit.

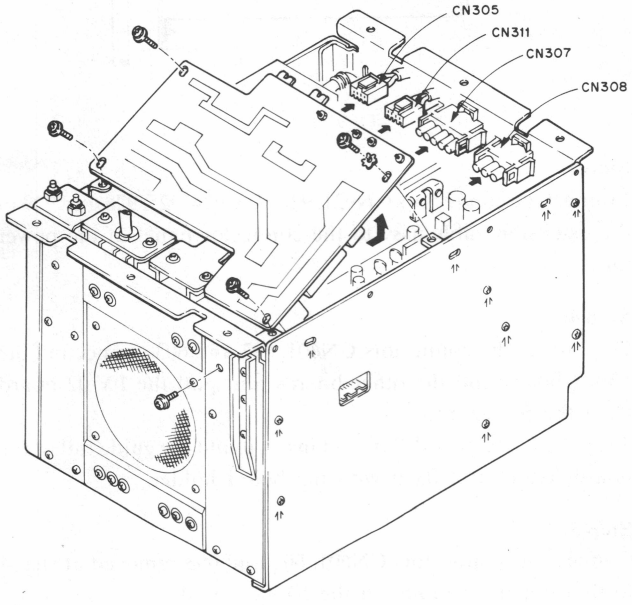
Step 5.
Turn on the power and perform the AC-39 board operation check and adjustment. The work must be performed in a short time.

Step 6.
After performing the operation check and adjustment, turn the power off and remove the power cord.
After passing five minutes or more, reinstall the rear panel to the power unit in reverse order of the above steps and install the power unit to the VTR.

9-1-3. AC-39 Board Part Replacement

Step 1.
Remove four screws securing the AC-39 board (one with external tooth washer) and a screw securing the heatsink for diodes and the bottom of the power unit.

Step 2.
Disconnect the connector CN305, 307, 308 and 311 from the AC-39 board. Lift the board gently not to give the excessive force to the harness and replace the part.



Step 3.
If the part replacement is difficult, you may remove the connectors except CN305, 307, 308 and 311, but after replacing the parts, connect them to their original positions.

Step 4.
When reinstalling the AC-39 board to the power unit after replacing the parts, tighten the four screws securing the board temporarily and tighten the screw securing the heatsink firmly, and finally tighten the above four screws firmly.

9-1-4. Load

1. No Load

Remove the connectors CN921 to CN928 (all except CN929) on the connector panel of the power unit and CN930 and CN931 for the fan motors on the side plate. The power unit is placed in no-load state.
(CN929 is connected to the power switch of the VTR.)

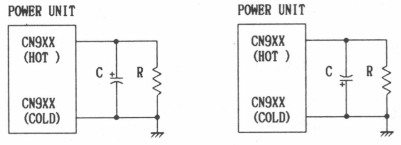
2. VTR Load

When performing the output check and adjustment of the power unit, the VTR is used as a load.

3. Standard Load

When performing the power unit operation check and adjustment, the dummy load (standard load) that is equivalent to the impedance of the VTR is connected to the power unit. The cold side of the standard load must be grounded and the load capacitor whose high frequency response is good must be used.
When performing the variable output system check, DC input voltage (2V) must be applied after the relays RY101 and 102 on the FV-01 board have been energized.
The following is the rated value of the standard load for each output.

Standard Load for Fixed Output Check



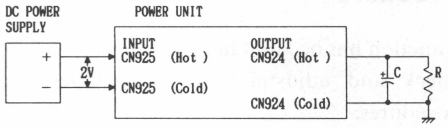
(Fig. 1)

(Fig. 2)

OUTPUT SYSTEM	Fig. No.	REPRESENTATIVE PIN Hot−Cold	LOAD C (μF / V)	LOAD * R	RATED CURRENT	RATED VOLTAGE MIN.	RATED VOLTAGE MAX.
+ 19 V	1	CN928 1− 3	100 / 25	43.5 Ω	460mA	+ 20 V	+ 25 V
− 19 V	2	CN928 5− 3	100 / 25	143 Ω	140mA	− 25 V	− 20 V
+ 6.8V	1	CN922 1− 6	100 / 25	0.48Ω	15 A	+ 6.9V	+ 8.0V
+ 13.8V	1	CN927 5− 7	100 / 25	2.12Ω	6.6A	+ 13.9V	+ 15.0V
− 13.8V	2	CN927 4−10	100 / 25	3.18Ω	4.4A	− 15.0V	− 13.9V
− 8.6V	2	CN927 9−17	100 / 25	5.56Ω	1.6A	− 15 V	− 8 V
+250 V	1	CN926 10− 8	1 /300	23.6kΩ	10mA	+225 V	+300 V
−250 V	2	CN926 6− 8	1 /300	23.6kΩ	10mA	−300 V	−225 V
− 48 V	2	CN926 1− 3	10 /100	825 Ω	60mA	− 65 V	− 48 V
+ 13 V	1	CN923 5− 6	100 / 25	10.4 Ω	1.2A	+ 12 V	+ 15 V
+ 13 V	1	CN923 1− 3	100 / 25	7.8 Ω	1.6A	+ 12 V	+ 15 V

*; Reference Value

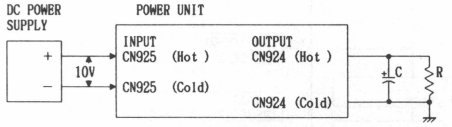
Standard Load for Variable Output Check



OUTPUT SYSTEM	2Vdc INPUT PIN Hot−Cold	OUTPUT PIN Hot−Cold	LOAD C (μF / V)	LOAD R (Ω/W)
SR VH	CN925 8− 7	CN924 1− 7	100 /100	50/8
TR VH	CN925 6− 5	CN924 2− 8	100 /100	50/8
DR VH	CN925 4− 3	CN924 5−10	100 /100	50/8
CP VH	CN925 2− 1	CN924 6−11	100 / 63	25/4

4. Critical Load

Used for power limit adjustment of the variable output system. The DC input voltage (10V) must be applied after the relays RY101 and 102 on the FV-01 board have been energized.
The following is the rated value of the critical load for each variable output.



OUTPUT SYSTEM	10Vdc INPUT PIN Hot−Cold	OUTPUT PIN Hot−Cold	LOAD C (μF / V)	LOAD R (Ω/W)
SR VH	CN925 8− 7	CN924 1− 7	100 /100	50/90
TR VH	CN925 6− 5	CN924 2− 8	100 /100	50/90
DR VH	CN925 4− 3	CN924 5−10	100 /100	50/90
CP VH	CN925 2− 1	CN924 6−11	100 / 63	25/45

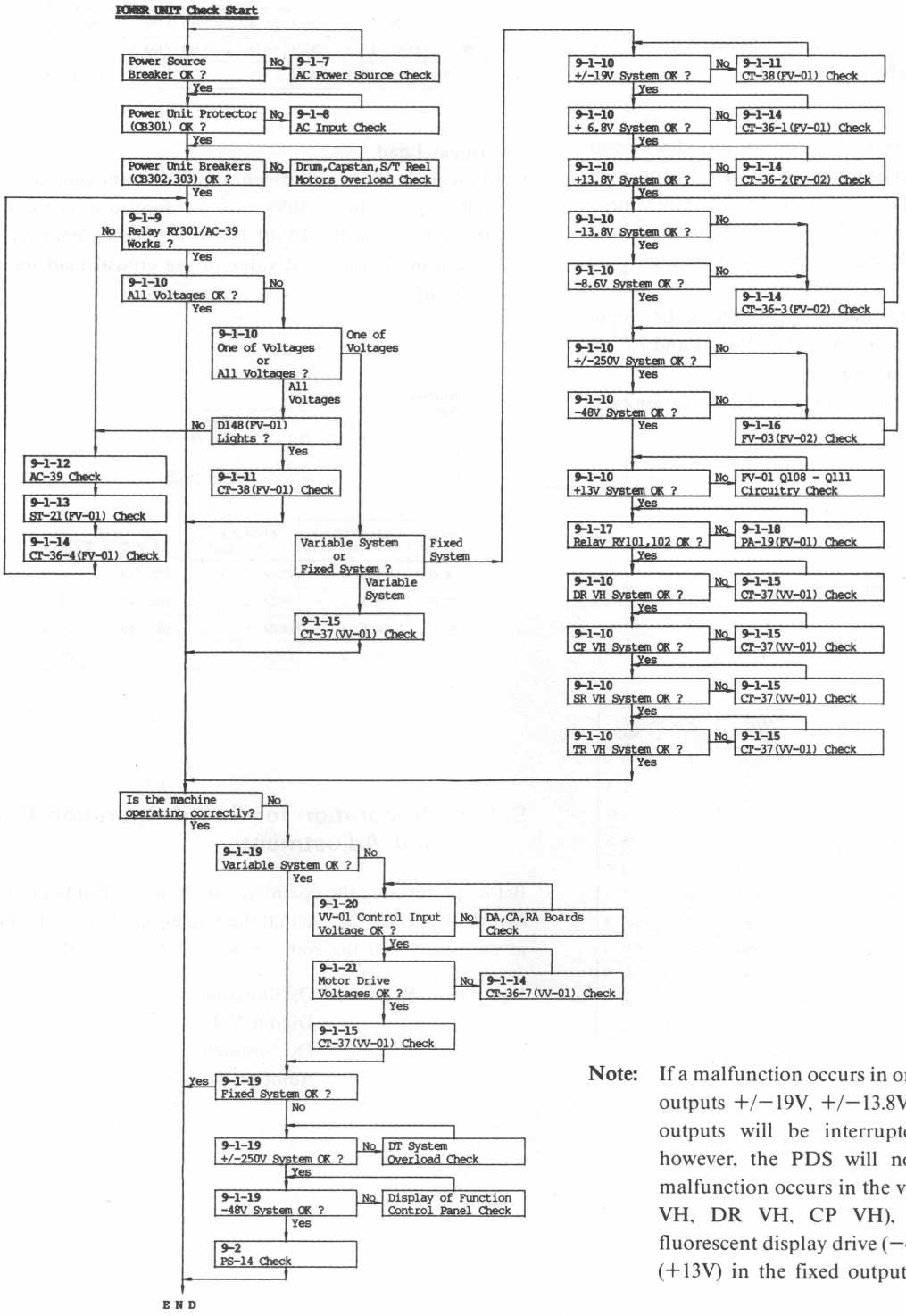
9-1-5. Preparation for Board Operation Check and Adjustment

Before performing the operation check and adjustment of each board, inspect by the eye that the foreign matter is not adhered to the board and the component is not abnormal.

Equipment Required: Oscilloscope
Digital Voltmeter
DC Ammeter
Autotransformer

9-1-6. Power Unit Check and Adjustment Procedure

When a malfunction has occured in the power unit, perform the operation check and adjustment in accordance with the following procedures.



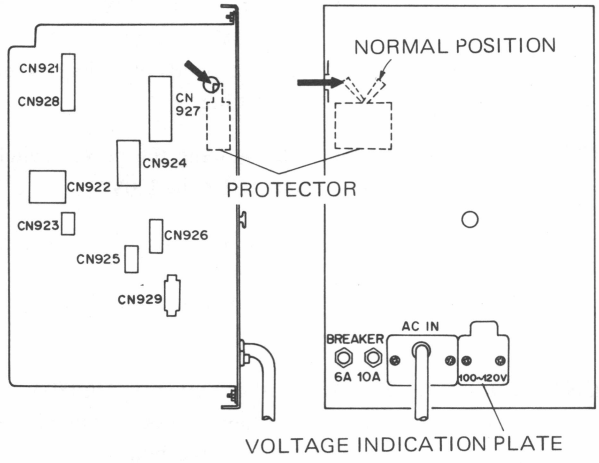
Note: If a malfunction occurs in one of the switching regulator outputs +/−19V, +/−13.8V, +6.8V and −8.6V, all the outputs will be interrupted by the PDS function, however, the PDS will not operate, even though a malfunction occurs in the variable outputs (SR VH, TR VH, DR VH, CP VH), or DT drive (+/−250V), fluorescent display drive (−48V) and fan/solenoid drive (+13V) in the fixed outputs.

9-1-7. AC Power Capacity Check

When the breaker for the AC power source has operated owing to the inadequate AC power source, use an AC power source with a larger capacity. See section 4-3-1.

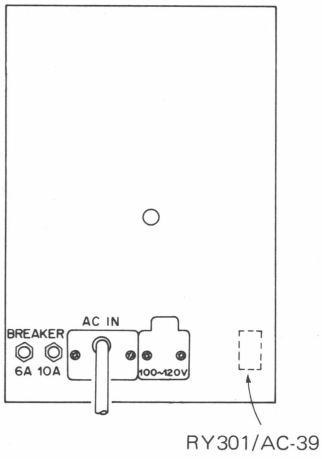
9-1-8. AC Input Voltage Check

When the power unit protector CB301 has operated, check that the AC input voltage is in the range of 90V to 132V and set the protector to the normal position.
Check that the voltage indication plate has been mounted on the power unit. If the plate is off, mount it and after 30 seconds or more, set the protector to the normal position.



9-1-9. Relay Switching Click Check with Power ON/OFF

The relay RY301 for rush current limiter has been mounted on the AC-39 board in the power unit.
Approach the ear to the rear panel of the power unit, turn on the power switch and check the switching click of the relay.



9-1-10. Power Unit No-Load Voltage Check

Disconnect the connectors CN921 to 928, 930 and 931 (except CN929) which connect the power unit to the VTR and the fans, to set the power unit to the no-load condition.
Turn on the power switch and check that each output voltage is in the range shown below.

Fixed Outputs

OUTPUT SYSTEM	TEST POINT Hot−Cold	OUTPUT VOLTAGE MIN.	MAX.
+ 19 V	CN928 1− 3	+ 20 V	+ 25 V
− 19 V	CN928 5− 3	− 25 V	− 20 V
+ 6.8V	CN922 1− 6	+ 6.9V	+ 8.0V
+ 13.8V	CN927 5− 7	+ 13.9V	+ 15.0V
− 13.8V	CN927 4−10	− 15.0V	− 13.9V
− 8.6V	CN927 9−17	− 15 V	− 8 V
+250 V	CN926 10− 8	+225 V	+300 V
−250 V	CN926 6− 8	−300 V	−225 V
− 48 V	CN926 1− 3	− 65 V	− 48 V
+ 13 V	CN923 1− 3	+ 12 V	+ 15 V
+ 13 V	CN930 1− 3	+ 12 V	+ 15 V

Variable Outputs

OUTPUT SYSTEM	TEST POINT Hot−Cold	OUTPUT VOLTAGE MIN.	MAX.
SR VH	CN924 1− 7	0V	+ 30V
TR VH	CN924 2− 8	0V	+ 30V
DR VH	CN924 5−10	0V	+ 30V
CP VH	CN924 6−11	0V	+ 15V

The variable outputs should be in the above range first and fall gradually to 0V.

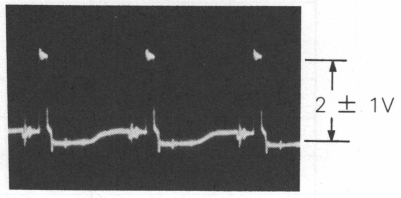
9-1-11. CT-38 (FV-01) Board Check

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Oscilloscope
Mode of VTR; STOP (STANDBY OFF)

TEST POINT
(Hot — Cold)

CT-38 ⑥ — ⑤; CT-38 board power supply voltage = 20.5 ± 3.5 Vdc

CT-38 ① — ⑤; Synchronizing pulse



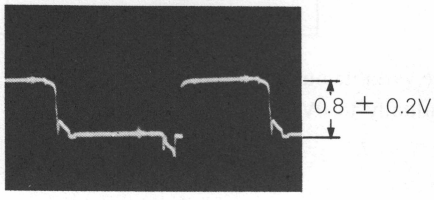
CT-38 ⑧ — ⑤; REF 5V = 5 ± 0.3 Vdc

CT-38 ③ — ⑤; Overheat detector input = 20 ± 4 Vdc
When the overheat sensor (90°C) works, it falls to 0V.

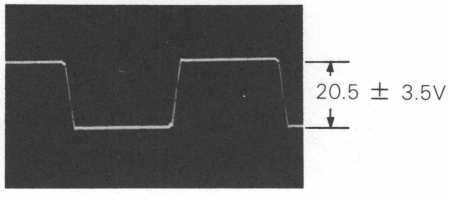
CT-38 ② — ⑤; PDS Input = 5 ± 0.5 Vdc
When the PDS operates, it falls to 0V.

CT-38 ⑦ — ⑤; Each board power supply voltage control output = 0.4 ± 0.4 Vdc

CT-38 ⑨ — ⑤; Q105 drive waveform
CT-38 ⑩ — ⑤; Q106 drive waveform



FV-01 TP113 — CT-38 ⑤; Converter transformer drive waveform



9-1-12. AC-39 Board Operation Check and Adjustment

1. Operation Check

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Autotransformer
Mode of VTR; STOP (STANDBY OFF)

TEST POINT
(Hot — Cold)

CN301 ① — ③; AC input voltage
NTSC/PM; AC 100 to 120V

PS; AC 100 to 120V or AC220 to 240V
It depends on voltage selector setting.

CN302 ① — ②; Voltage after passing the power switch
NTSC/PM; AC100 to 120V

PS; AC100 to 120V or AC220 or 240V
It depends on voltage selector setting.

CN308 ③ — ②; Primary rectified voltage = DC180 to 380V
When the voltage is not outputted, check the fuse F301 on the board.

If the fuse F301 is broken, replace it with a new one and perform the following check.

Step 1.
Leave the connectors (CN305 and CN102, CN311 and CN104, CN307 and CN101) connecting the AC-39 board to FV-01 board, and remove the others except CN309 and CN310 on the AC-39 board inside the power unit.

Step 2.
Turn the power switch on and check the switching click of the relay RY301. See section 9-1-9.
If the switching click is not heard, check the rush current limiter consisting of IC301 and Q304.

Both Leads of C313; Sub-rectifying voltage = DC170 to 380V
Note: The sub-rectified voltage allows the detection of the AC input voltage and switching of the relay RY301 for the rush current limiter.

2. Surge Current Protector Adjustment

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Autotransformer
Mode of VTR; STOP (STANDBY OFF)

Step 1.
Disconnect CN921, 922, 923, 924, 925, 926, 927 and 928 from the power unit

Step 2.
Connect AC power cable to the autotransformer and turn on the power. Set the voltage across C313/AC-39 for 140 Vdc with the autotransformer.

Step 3. Adjustment AC-39 Board

RY301 = Just ON
◐ RV302/AC-39

3. Low AC Input Voltage Protector Adjustment

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Autotransformer
Mode of VTR; STOP (STANDBY OFF)

Step 1.
Disconnect CN921, 922, 923, 924, 925, 926, 927 and 928 from the connector panel of the power unit.

Step 2.
Connect AC power cable to the autotransformer and turn on the power. Set the voltage across C313/AC-39 for 170 Vdc with the autotransformer.

Step 3. Adjustment AC-39 Board

IC301 pin-14 = LOW level
(at the transition of the level)
◐ RV303/AC-39

Step 4.
Set the voltage across C313/AC-39 for 165 Vdc with the autotransformer, and after 1 minute or more, check the circuit protector CB301/AC-39 activates.

4. High AC Input Voltage Protector Adjustment

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Autotransformer
Mode of VTR; STOP (STANDBY OFF)

Step 1.
Disconnect CN921, 922, 923, 924, 925, 926, 927 and 928 from the connector panel of the power unit.

Step 2.
Connect AC power cable to the autotransformer and turn on the power. Set the voltage across C313/AC-39 for 400 Vdc with the autotransformer.

Step 3. Adjustment AC-39 Board
Turn ◐RV301/AC-39 gradually clockwise and stop it where the circuit protector CB301/AC-39 just activates.
After 30 seconds or more, set the protector to the normal position.

9-1-13. ST-21 (FV-01) Board Operation Check

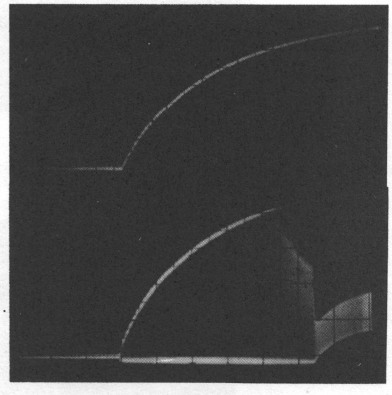
Load; VTR Load (See section 9-1-4.)
Equipment; Oscilloscope
Mode of VTR; STOP (STANDBY OFF)

1. Check the waveform just after the power switch is turned on.

TEST POINT
(Hot — Cold)

ST-21 ① — ⑤;
Charging waveform of the primary voltage

ST-21 ② — ⑤;
Switching waveform of the power starting



9-1-14. CT-36 (FV-01/FV-02/VV-01) Board Operation Check and Adjustment

The power unit has seven CT-36 boards as follows

FV-01 Board: CT-36-1
CT-36-4
FV-02 Board: CT-36-2
CT-36-3
VV-01 Board: CT-36-7 (three boards)

For the CT-36 board whose suffix number is not specified in the following, the operation check and adjustment are applied to all the CT-36 boards.

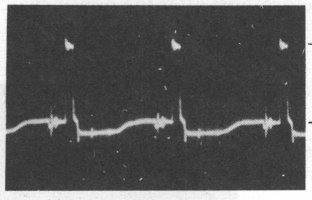
1. Operation Check

Load: VTR Load (See section 9-1-4.)
Equipment: Digital Voltmeter
Oscilloscope
Mode of VTR: CT-36-1, 2, 3, 4 STOP (STANDBY OFF)
CT-36-7 STOP (STANDBY ON)

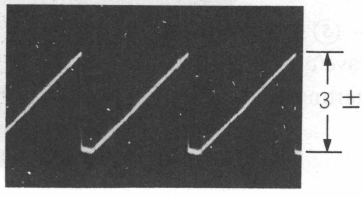
TEST POINT
(Hot — Cold)

CT-36 ⑩ — ⑦: Power supply voltage
CT-36-1, 2, 3, 7 = 17.5 ± 1.5 Vdc
CT-36-4 = 18.5 ± 1.5 Vdc

CT-36 ① — ⑦: Synchronizing pulse
(CT-36-4/FV-01 board check is not required.)



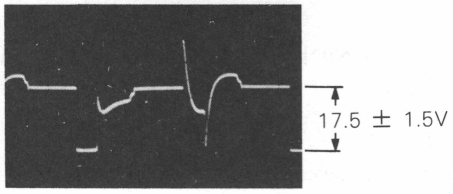
CT-36 ② — ⑦: Sawtooth generator waveform



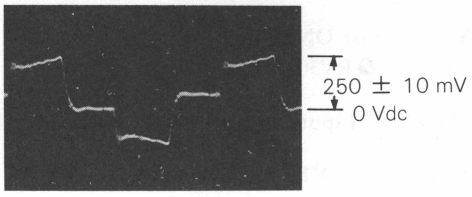
CT-36 ⑤ — ⑦: REF 5V = 5 ± 0.3 Vdc

CT-36 ③ — ⑦: DEAD CONT voltage = 0.8 ± 0.5 Vdc

CT-36 ⑥ — ⑦: Drive transformer switching waveform
CT-36 ⑧ — ⑦: Drive transformer switching waveform

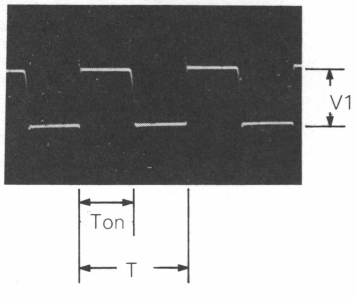


CT-36 ⑪ — ⑦: Excessive current detection input
CT-36 ⑫ — ⑦: Excessive current detection input



Converter Rectified output

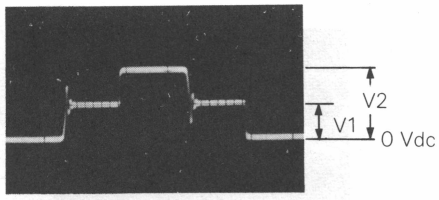
BOARD	TEST POINT Hot—Cold	Vo CHECK POINT Hot—Cold
CT-36-4	FV-01 TP110—109	FV-01 C141 ⊕—⊖
CT-36-1	FV-01 TP108—106	FV-01 CN922 1— 5
CT-36-2	FV-02 TP604—605	FV-02 CN927 5— 7
CT-36-3	—13.8V FV-02 TP608—609	FV-02 CN927 4— 1
CT-36-3	— 8.6V FV-02 TP612—611	FV-02 CN927 9—17
CT-36-7	SR VH VV-01 L202 ⑨—TP205	VV-01 TP206—205
CT-36-7	TR VH VV-01 L207 ⑨—TP213	VV-01 TP212—213
CT-36-7	DR VH VV-01 L212 ⑨—TP220	VV-01 TP219—220
CT-36-7	CP VH VV-01 L217 ⑨—TP225	VV-01 TP224—225



$$Vo = V1 \times \frac{Ton}{T} \pm 20\%$$

Switching Voltage

BOARD	TEST POINT Hot−Cold
CT-36-4	FV-01 TP105−101
CT-36-1	FV-01 TP104−101
CT-36-2	FV-02 TP603−602
CT-36-3	FV-02 TP607−602
CT-36-7	SR VH VV-01 TP203−201
CT-36-7	TR VH VV-01 TP210−201
CT-36-7	DR VH,CP VH VV-01 TP217−201



$$V1 = \frac{V2}{2} \pm 20\%$$

2. Output Voltage Adjustment

When the adjustment of ◐RV171 is required, check the CT-36 board specified in the following table.

Load; VTR Load/Standard Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Mode of VTR; STOP (STANDBY OFF)

BOARD	TEST POINT Hot−Cold	SPECIFICATIONS VTR LOAD	SPECIFICATIONS STANDARD LOAD
CT-36-4	FV-01 C141 ⊕−⊖	+19.0±0.5V	+19.0±0.5V
CT-36-1	FV-01 CN922 1− 6	+ 7.2±0.3V	+ 7.1±0.1V
CT-36-2	FV-02 CN927 5− 7	+14.1±0.2V	+14.0±0.1V
CT-36-3	FV-02 CN927 4− 1	−14.1±0.2V	−14.0±0.1V
CT-36-7	SR VH VV-01 TP206−205	+94.0±0.5V *+90.0±1.0V	+94.0±0.5V *+90.0±1.0V
CT-36-7	TR VH VV-01 TP212−213	+94.0±0.5V *+90.0±1.0V	+94.0±0.5V *+90.0±1.0V
CT-36-7	DR VH,CP VH VV-01 TP219−220	+94.0±0.5V *+90.0±1.0V	+94.0±0.5V *+90.0±1.0V

* : POWER UNIT with Serial No. up to 902813.

9-1-15. CT-37 (VV-01) Board Operation Check and Adjustment

The four CT-37 boards are used on the VV-01 board as follows.

CT-37 (SR VH)
CT-37 (TR VH)
CT-37 (DR VH)
CT-37 (CP VH)

For the CT-37 board whose output system name is not specified in the following, the operation check and adjustment are applied to all the CT-37 boards.

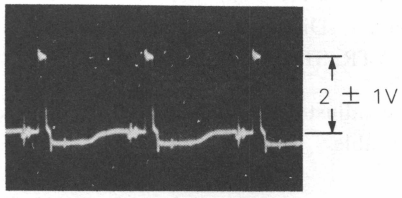
1. Operation Check

Load; VTR Load (See section 9-1-4.)
Equipment; Digital voltmeter
Oscilloscope
Mode of VTR: STOP (STANDBY OFF)

TEST POINT
(Hot — Cold)

CT-37 ① — ⑧; CT-37 board power supply voltage = 17.5 ± 1.5 Vdc

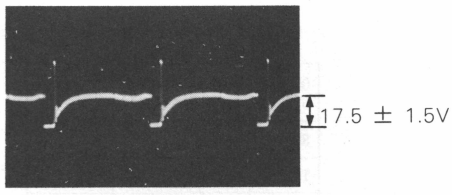
CT-37 ② — ⑧; Synchronizing pulse



CT-37 ⑩ — ⑧; Motor drive control input voltage

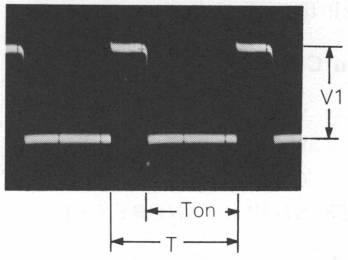
OUTPUT SYSTEM	TEST POINT IN Hot−Cold	TEST POINT OUT Hot−Cold	SPEC. IN : OUT	TOLERANCE
SR VH	CT-37 ⑩−⑧	CN924 1− 7	1 : 10	± 5%
TR VH	CT-37 ⑩−⑧	CN924 2− 8	1 : 10	± 5%
DR VH	CT-37 ⑩−⑧	CN924 5−10	1 : 10	± 5%
CP VH	CT-37 ⑩−⑧	CN924 6−11	1 : 5	± 5%

CT-37 ③ — ⑧; Switching transistor drive waveform



Motor Drive Voltage

OUTPUT SYSTEM	TEST POINT Hot−Cold	Vo CHECK POINT Hot−Cold
SR VH	VV-01 TP207−208	CN924 1− 7
TR VH	VV-01 TP214−216	CN924 2− 8
DR VH	VV-01 TP221−223	CN924 5−10
CP VH	VV-01 TP226−228	CN924 6−11



$$Vo = V1 \times \frac{Ton}{T} \pm 20\%$$

2. Output Voltage Adjustment

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Mode of VTR; STOP (STANDBY OFF)

When the adjustment of ◐ RV672 is required, refer to the following table.

OUTPUT SYSTEM	TEST POINT IN Hot−Cold	TEST POINT OUT Hot−Cold	SPEC. IN : OUT	TOLERANCE
SR VH	CT-37 ⑩−⑧	CN924 1− 7	1 : 10	± 5%
TR VH	CT-37 ⑩−⑧	CN924 2− 8	1 : 10	± 5%
DR VH	CT-37 ⑩−⑧	CN924 5−10	1 : 10	± 5%
CP VH	CT-37 ⑩−⑧	CN924 6−11	1 : 5	± 5%

3. Output Power Adjustment

Load; Critical Load (See section 9-1-4.)
Equipment; Digital Voltmeter

When the adjustment of ◐ RV671 is required, refer to the following table.

OUTPUT SYSTEM	TEST POINT Hot−Cold	SPEC.
SR VH	CN924 1− 7	+65±2V
TR VH	CN924 2− 8	+65±2V
DR VH	CN924 5−10	+65±2V
CP VH	CN924 6−11	+33±2V

9-1-16. FV-03 (FV-02) Board Operation Check and Adjustment

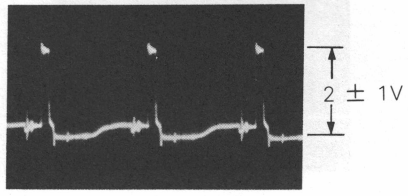
1. Operation Check

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Oscilloscope
Mode of VTR; STOP (STANDBY OFF)

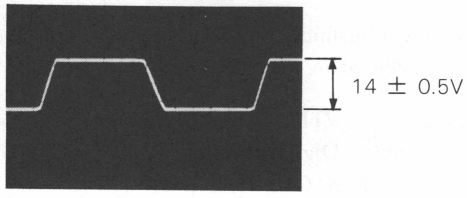
TEST POINT
(Hot — Cold)

FV-03 ⑥ — ⑦; FV-03 board power supply voltage
= 14 ± 0.5 Vdc

FV-03 ⑧ — ⑦; Synchronizing pulse



Q652 COLLECTOR — ⑦; Converter transformer drive waveform
Q653 COLLECTOR — ⑦; Converter transformer drive waveform



2. Output Power Adjustment

When the adjustment of ◐ RV651/FV-03 board is required, perform the following steps.

Load; VTR Load (See section 9-1-4.)
Equipment; Ammeter
Mode of VTR; STOP (STANDBY OFF)

Step 1.
Connect the Ammeter in series to pin ⑥ on the FV-03 board.

Step 2.
Connect the jumper between CN926 pin-1 and pin-3 to short-circuit the −48V output.

Step 3. Adjustment
Current = 0.2 ± 0.02A
◐ RV651/FV-03

Step 4.
After the adjustment, remove the jumper.

9-1-17. RY101, 102/FV-01 Operation Check

Load; No-Load (See section 9-1-4.)

CN921 8-1 Spec.; 0Ω
CN921 8-5 Spec.; 0Ω

If outside the specifications, perform section 9-1-18 PA-19 board operation check.

9-1-18. PA-19 (FV-01) Board Operation check and Adjustment

1. Operation Check

Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Oscilloscope
Mode of VTR; STOP (STANDBY OFF)

TEST POINT
(Hot — Cold)

PA-19 ⑤ — ⑫; PA-19 board power supply voltage = 20 ± 3 Vdc

PA-19 ⑥ — ⑫; Relay (RY101, 102) drive output voltage = 20 ± 3 Vdc

PA-19 ⑦ — ⑫; PA-19 board voltage detector input = 11 ± 1.5 Vdc

PA-19 ① — ⑫; P.A. (Power Active) output = 11 ± 1 Vdc
When the primary voltage falls to 180V or less, the output becomes 0V.

PA-19 ⑧ — ⑫; Overheat detection input = 20 ± 3 Vdc
When the overheat sensor (90°C) is operated, the input becomes 0V.

PA-19 ② — ⑫; 19V detection input = 22 ± 3 Vdc

PA-19 ⑨ — ⑫; PDS input = 5 ± 0.5 Vdc
When the PDS is operated, the input becomes 0V.

PA-19 ⑩ — ⑫; Relay RY101 control output voltage
PA-19 ⑪ — ⑫; Relay RY102 control output voltage = 5 ± 1 Vdc

2. Adjustment

When the adjustment of ◐ RV371/PA-19 board is required, performed the following steps.

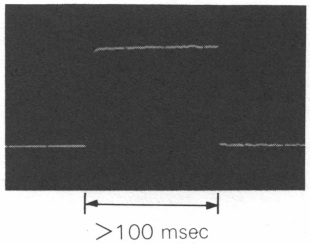
Load; VTR Load (See section 9-1-4.)
Equipment; Digital Voltmeter
Oscilloscope
Autotransformer
Mode of VTR; STOP (STANDBY OFF)

Step 1.
Set the DC input voltage across CN101 pin-1 and pin-2 on the FV-01 board for +180V with the autotransformer.

Step 2. Adjustment
Voltage of CN921 8-1 = 0 Vdc
◐ RV371/PA-19

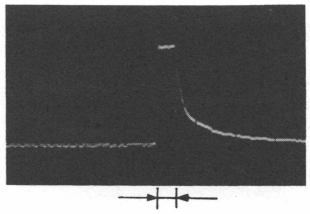
Step 3.
After the adjustment, check the waveform of edge connector 45B on the SV-43 board installed into the card rack.

POWER ON



>100 msec

POWER OFF



>5 msec

9-1-19. Power Unit Loaded Output Voltage Check

Disconnect the connector CN921 from the connector panel of the power unit to stop the PDS function, and turn the power on. Set the VTR into the STOP (STANDBY OFF) mode and check that each output voltage is in the range shown below.

Fixed Outputs

OUTPUT SYSTEM	TEST POINT Hot−Cold	OUTPUT VOLTAGE MIN.	OUTPUT VOLTAGE MAX.
+ 19 V	PS-14 TP20−C84 ⊖	+ 20 V	+ 25 V
− 19 V	PS-14 TP19−C86 ⊕	− 25 V	− 20 V
+ 6.8V	PS-14 TP15−C3 ⊖	+ 6.9V	+ 8.0V
+ 13.8V	PS-14 TP21−C81 ⊖	+ 13.9V	+ 15.0V
− 13.8V	PS-14 TP22−C76 ⊕	− 15.0V	− 13.9V
− 8.6V	PS-14 TP14−C4 ⊕	− 15 V	− 8 V
+250 V	CN926 10− 8	+225 V	+300 V
−250 V	CN926 6− 8	−300 V	−225 V
− 48 V	CN926 1− 3	− 65 V	− 48 V

Variable Outputs

OUTPUT SYSTEM	TEST POINT Hot−Cold	OUTPUT VOLTAGE MIN.	OUTPUT VOLTAGE MAX.
SR VH	CN924 1− 7	+ 18V	+ 30V
TR VH	CN924 2− 8	+ 18V	+ 30V
DR VH	CN924 5−10	+ 18V	+ 30V
CP VH	CN924 6−11	+ 8V	+ 15V

9-1-20. VV-01 Board Control Input Voltage Check

Check that the connectors CN921 to CN929 have been connected to the proper positions on the connector panel of the power unit.
Set the VTR into the STOP (STANDBY OFF) mode and check that the reference input voltage of each variable output system is in the range shown below.

OUTPUT SYSTEM	TEST POINT Hot−Cold	REF. INPUT VOLTAGE
SR VH	CN925 8− 7	+2.5 ±0.5V
TR VH	CN925 6− 5	+2.5 ±0.5V
DR VH	CN925 4− 3	+2.5 ±0.5V
CP VH	CN925 2− 1	+2.5 ±0.5V

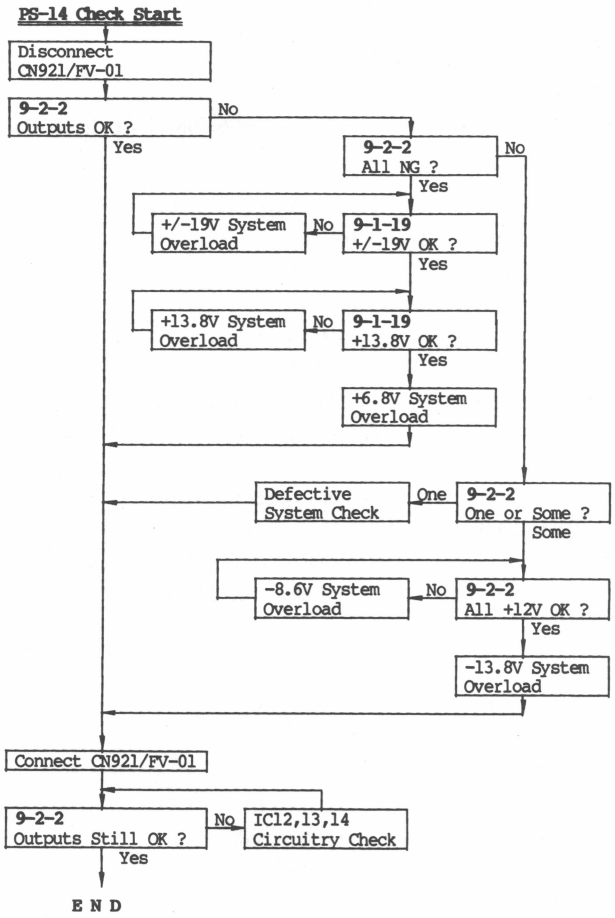
9-1-21. VV-01 Board Motor Drive Voltage Check

Check that the connectors CN921 to CN929 have been connected to the proper positions on the connector panel of the power unit.
Set the VTR into the STOP (STANDBY OFF) mode and check that the motor drive voltage of each variable output system is in the range shown below.

OUTPUT SYSTEM	TEST POINT Hot−Cold	MOTOR DRIVE VOLTAGE
SR VH	VV-01 TP206 −205	+90±4.5V
TR VH	VV-01 TP212 −213	+90±4.5V
DR VH	VV-01 TP219 −220	+90±4.5V
CP VH	VV-01 TP224 −225	+47±2.5V

9-2. PS-14 BOARD (SERIES REGULATOR) OPERATION CHECK

9-2-1. PS-14 Board Operation Check Procedure



9-2-2. PS-14 Board Output Check

Equipment: Digital Voltmeter
Mode of VTR: STOP (STANDBY OFF)

Proceed the check in accordance with the flowchart of section 9-2-1.

PS-14 Board

OUTPUT SYSTEM	TEST POINT Hot −Cold	RATED VOLTAGES
+12V	TP 6−TPE5	+12.0 to 12.2V
+12V	TP 8−TPE5	+12.0 to 12.2V
+12V	TP11−TPE6	+12.0 to 12.2V
+12V	TP12−TPE6	+12.0 to 12.2V
−12V	TP 7−TPE5	−12.2 to 12.0V
−12V	TP 9−TPE6	−12.2 to 12.0V
−12V	TP10−TPE6	−12.2 to 12.0V
−12V	TP13−TPE6	−12.2 to 12.0V
+ 5V	TP 1−TPE2	+ 5.0 to 5.2V
+ 5V	TP 4−TPE3	+ 5.0 to 5.2V
+ 5V	TP 5−TPE3	+ 5.0 to 5.2V
− 5V	TP 2−TPE2	− 5.2 to 5.0V
− 6V	TP 3−TPE2	− 6.2 to 6.0V

9-3. PS-14 BOARD (SERIES REGULATOR) ADJUSTMENT

9-3-1. +5V Adjustment

Equipment; Digital Voltmeter
Mode of VTR; STOP

Adjustment

For Mother board with board No. 1-606-708-11 of the BVH-2000.

MD-14 pin-47 = +5.00 ±0.02 Vdc
⊘RV1/PS-14
SR-15 pin-47 = +5.00 ±0.02 Vdc
⊘RV4/PS-14
PS-14 TP5-TPE3 = +5.00 ±0.02 Vdc
⊘RV5/PS-14

For Mother board with board No. other than above of the BVH-2000, BVH-2500 or BVH-2180.

Insert the extender into slot No.9 (CN339) on the card rack. The voltages can be measured at the TPs on the extender.

Extender TP47 = +5.00 ±0.02 Vdc
⊘RV1/PS-14
Extender TP8A = +5.00 ±0.02 Vdc
⊘RV4/PS-14
Extender TP8B = +5.00 ±0.02 Vdc
⊘RV5/PS-14

9-3-2. +12V Adjustment

Equipment; Digital Voltmeter
Mode of VTR; STOP

Adjustment

For Mother board with board No. 1-606-708-11 of the BVH-2000.

MD-14 pin-3 = +12.00 ±0.02 Vdc
⊘RV6/PS-14
SR-15 pin-3 = +12.00 ±0.02 Vdc
⊘RV8/PS-14
AU-27 pin-3 = +12.00 ±0.02 Vdc
⊘RV11/PS-14
PS-14 TP12-TPE4 = +12.00 ±0.02 Vdc
⊘RV12/PS-14

For Mother board with board No. other than above of the BVH-2000, BVH-2500 or BVH-2180.

Insert the extender into slot No. 9 (CN339) on the card rack. The voltages can be measured at the TPs on the extender.

Extender TP3 = +12.00 ±0.02 Vdc
⊘RV6/PS-14
Extender TP7A = +12.00 ±0.02 Vdc
⊘RV8/PS-14
Extender TP9B = +12.00 ±0.02 Vdc
⊘RV11/PS-14
Extender TP5A = +12.00 ±0.02 Vdc
⊘RV12/PS-14

9-3-3. −5V Adjustment

Equipment; Digital Voltmeter
Mode of VTR; STOP

Adjustment
For Mother board with board No. 1-606-708-11 of the BVH-2000.

AD pin-46 = −5.00 ±0.02 Vdc
◐RV2/PS-14

For Mother board with board No. other than above of the BVH-2000, BVH-2500 or BVH-2180.
Insert the extender into slot No. 9 (CN339) on the card rack.
The voltages can be measured at the TPs on the extender.

Extender TP46 = −5.00 ±0.02 Vdc
◐RV2/PS-14

9-3-4. −6V Adjustment

Equipment; Digital Voltmeter
Mode of VTR; STOP

Adjustment
For Mother board with board No. 1-606-708-11 of the BVH-2000.

AD pin-40 = −6.00 ±0.02 Vdc
◐RV3/PS-14

For Mother board with board No. other than above of the BVH-2000, BVH-2500 or BVH-2180.
Insert the extender into slot No. 9 (CN339) on the card rack.
The voltages can be measured at the TPs on the extender.

Extender TP11B = −6.00 ±0.02 Vdc
◐RV3/PS-14

9-3-5. −12V Adjustment

Equipment; Digital Voltmeter
Mode of VTR; STOP

Adjustment
For Mother board with board No. 1-606-708-11 of the BVH-2000.

MD-14 pin-4 = −12.00 ±0.02 Vdc
◐RV7/PS-14
SR-15 pin-4 = −12.00 ±0.02 Vdc
◐RV9/PS-14
AU-27 pin-4 = −12.00 ±0.02 Vdc
◐RV10/PS-14
PS-14 TP13-TPE4 = −12.00 ±0.02 Vdc
◐RV13/PS-14

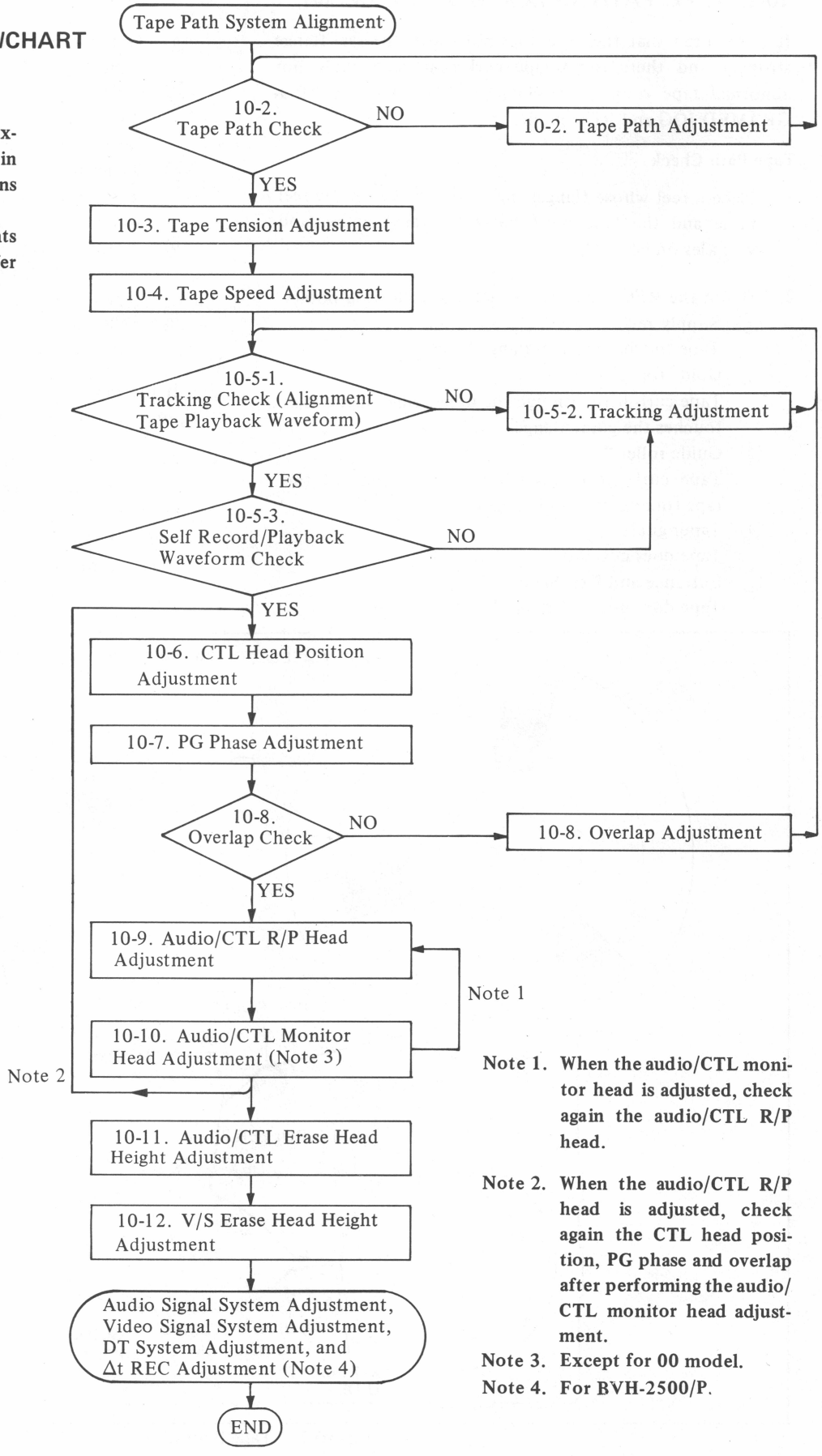
For Mother board with board No. other than above of the BVH-2000, BVH-2500 or BVH-2180.
Insert the extender into slot No. 9 (CN339) on the card rack.
The voltages can be measured at the TPs on the extender.

Extender TP4 = −12.00 ±0.02 Vdc
◐RV7/PS-14
Extender TP6B = −12.00 ±0.02 Vdc
◐RV9/PS-14
Extender TP10B = −12.00 ±0.02 Vdc
◐RV10/PS-14
Extender TP5B = −12.00 ±0.02 Vdc
◐RV13/PS-14

SECTION 10
TAPE PATH SYSTEM ALIGNMENT

10-1. ADJUSTMENT FLOWCHART

Note:
The following flowchart and explanation are provided for use in finding the cause of malfunctions and troubleshooting.
When performing the adjustments after replacing the parts, refer to Section 3-24.

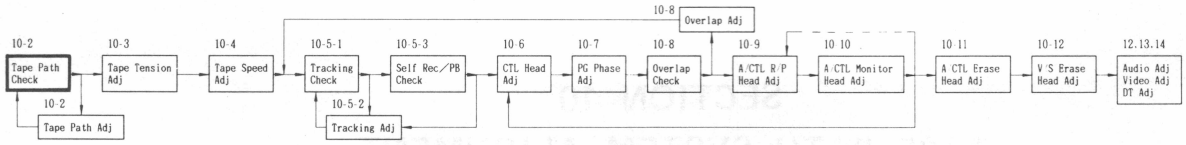


Note 1. When the audio/CTL monitor head is adjusted, check again the audio/CTL R/P head.

Note 2. When the audio/CTL R/P head is adjusted, check again the CTL head position, PG phase and overlap after performing the audio/CTL monitor head adjustment.

Note 3. Except for 00 model.

Note 4. For BVH-2500/P.



10-2. TAPE PATH CHECK & ADJUSTMENT

It is required that the tape does not touch the reel flange strongly and there is no tape curl near each guide nor abnormal tape running in REC, F·FWD, REV x 1 PROGRAMED JOG and REW modes.

Tape Path Check

1. Place a reel whose flanges have little shake on the reel table and the tape must be free from scratches and wrinkles on both edges.

2. Set in the REC mode and check the following points.
   - ① Supply reel:
     Tape touches the reel flange little.
   - ② Guide roller 1:
     Tape curls little, though the upper edge of the tape touches the guide flange.
   - ③ Guide roller 2:
     Tape curls little, though the lower edge of the tape touches the guide flange.
   - ④ Taper guide:
     Tape does not curl.
   - ⑤ Entrance and Exit Slant Guides:
     Tape does not curl along the guide flange.
   - ⑥ Guide roller 3 or Guide post 3:
     Tape does not curl.
   - ⑦ Guide post 1:
     Tape does not curl, though the lower edge of the tape touches the guide flange.
   - ⑧ Timer roller:
     Tape curls little, though the upper edge of the tape touches the flange.
   - ⑨ T-tension arm
     Tape curls little, though the lower edge of the tape touches the flange.
   - ⑩ Take-up reel:
     Tape touches the reel flange little.

3. If the tape does not run in accordance with the above items, adjust the height of the reel tables or guides.

4. Check Step 2 in the order of the F.FWD, REV x 1 SHUTTLE and REW mode. If necessary, adjust the height of the reel tables or guides.
   Note: If the height of the tape path on the timer roller varies in the REC, F.FWD or REW mode, adjust the slant of the timer roller so that the tape runs at the same height in the REC mode.

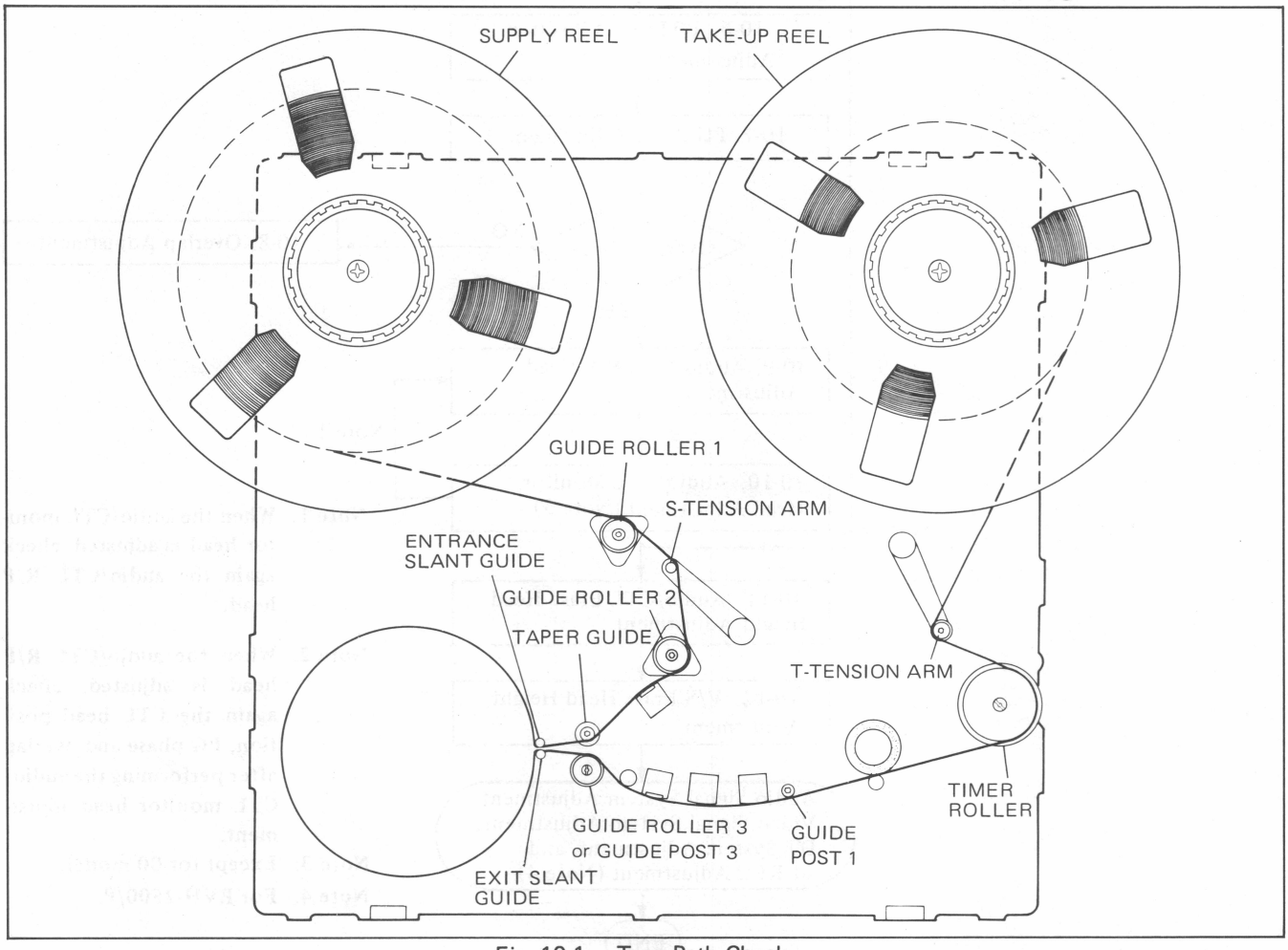
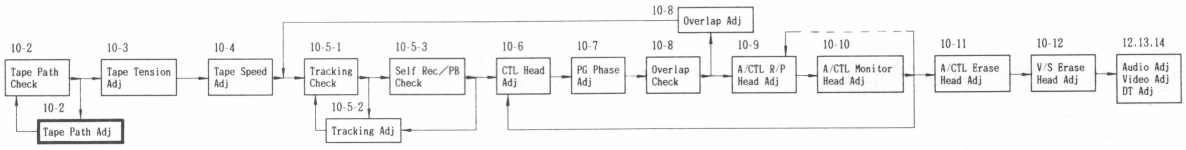


Fig. 10-1. Tape Path Check



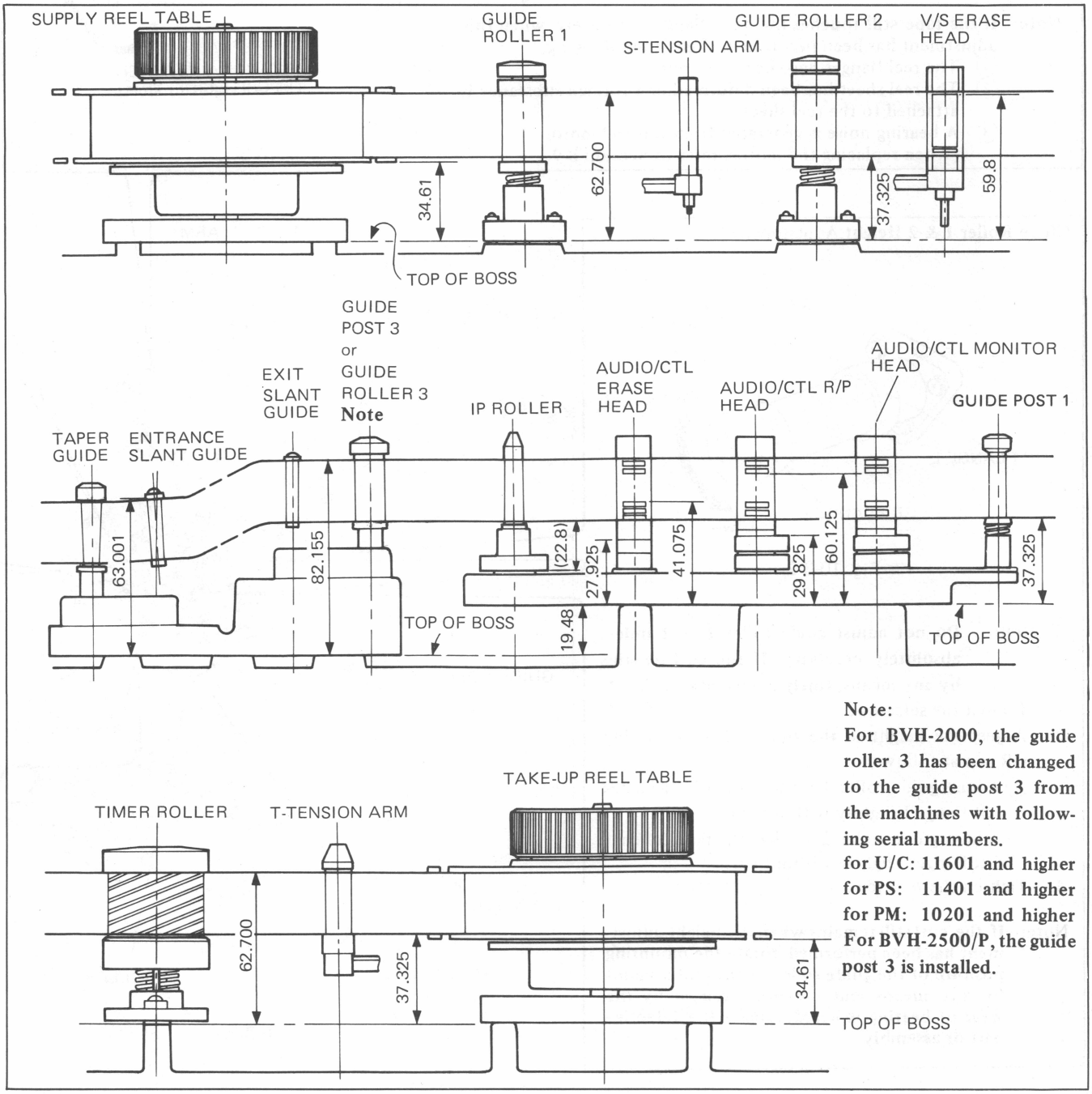
Guide Height Adjustment

The height of the guides is shown in Fig. 10-2.
When the part is replaced or when the height of the guide has been changed excessively, mount it after adjusting the height of the guides to the value shown below.

Note 1: Do not adjust the guides, especially guide roller 2, taper guide, entrance slant guide, exit slant guide, guide post 3 (or guide roller 3) and guide post 1 unless absolutely necessary. When these guides have been adjusted, check the tracking and the height of the stationary heads.

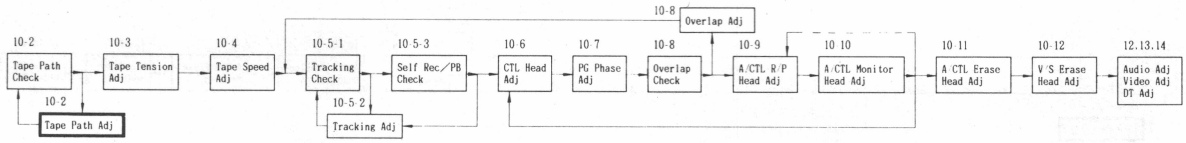
Note 2: The entrance and exit slant guide should not be adjusted in this section.

Note 3: For the V/S erase head, audio/CTL erase head, auido/CTL R/P head and audio/CTL monitor head, the adjustment is not required in this section.



Note:
For BVH-2000, the guide roller 3 has been changed to the guide post 3 from the machines with following serial numbers.
for U/C: 11601 and higher
for PS: 11401 and higher
for PM: 10201 and higher
For BVH-2500/P, the guide post 3 is installed.

Fig. 10-2. Guide Height



Supply and Take-up Reel Table Height Adjustment

1. Remove the cover and reel washer.
2. Loosen setscrews A and B.
3. While pushing the reel table lightly, in the direction of the arrow, adjust the height of the reel table by turning setscrew C.
   Note: Adjust the height of the reel table so that the tape runs without touching the reel flange.
4. Tighten setscrews A and B and mount the reel washer and cover.

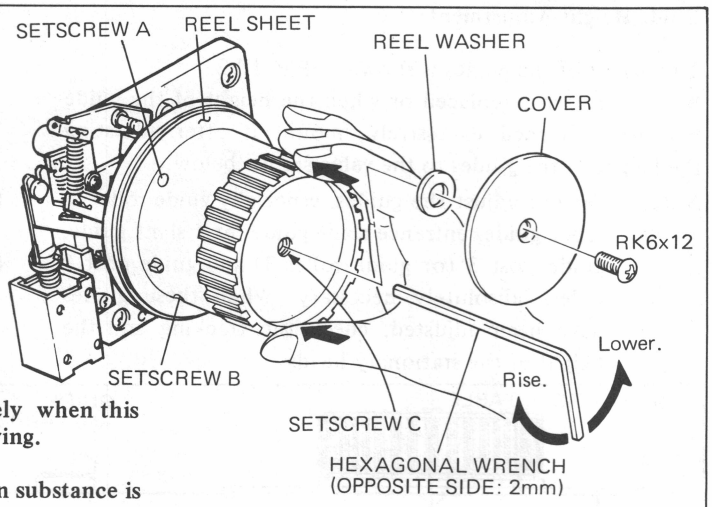


Fig. 10-3-1.

Note: If the tape still touches the reel flange excessively when this adjustment has been performed, check the following.

① **The reel flanges have been deformed.**
② **The reel sheet has been deformed or a foreign substance is attached to the reel sheet.**
③ **A bearing noise is generated from the reel motor. (When replacing the motor, refer to Section 3-9.)**

Guide Roller 1 & 2 Height Adjustment

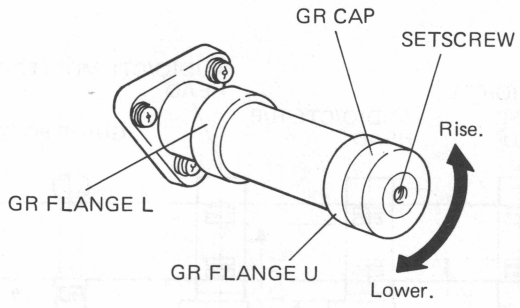


Fig. 10-3-2.

Caution: Do not adjust guide roller 1 & 2 unless absolutely necessary. If the curl remains by any means, finely adjust guide roller 1.

1. Loosen the setscrew.
2. Adjust the height of the guide roller by turning GR cap as follows.
   ① Adjust guide roller 1 so that the tape touches GR flange U lightly without curl.
   ② Adjust guide roller 2 so that the tape touches GR flange L lightly without curl.
3. Tighten the setscrew.

Note: If the curl still remains when the height adjustment has been performed, rotate the mounting position of the guide roller. If the curl remains by any means and the noise caused by the wear of bearing is heard, replace the defective part or assembly.

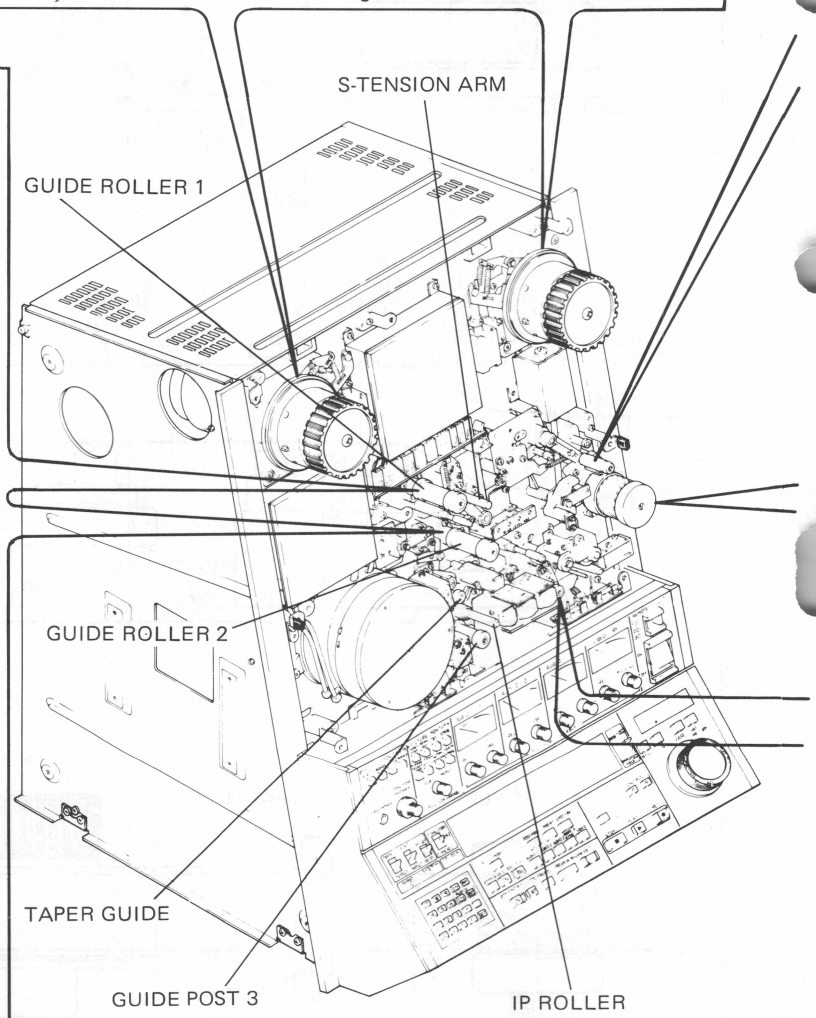
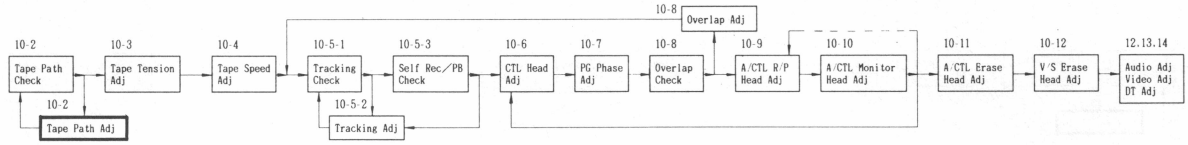


Fig. 10-3-3.



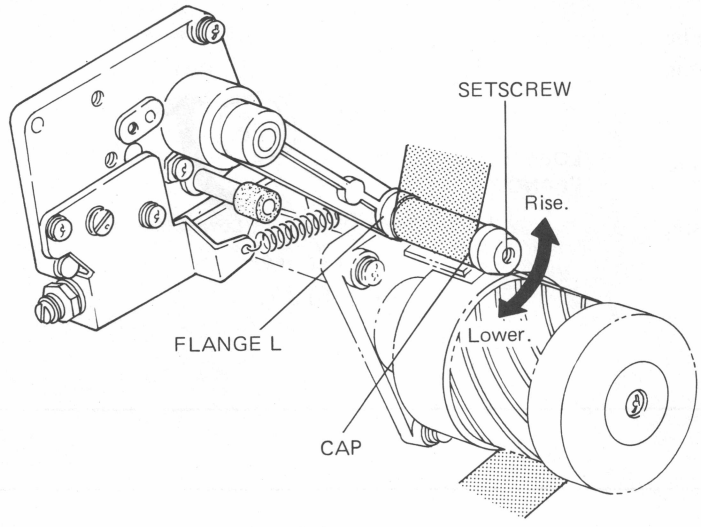


Fig. 10-3-4.

T-Tension Arm Height Adjustment

1. Loosen the setscrew.
2. Set the machine in the REC mode. While checking that the tape does not curl along the timer roller, adjust the height of T-tension arm by turning the cap so that the tape touches flange L.
3. Set the machine in the REV x 1 SHUTTLE mode. Adjust again that there is no tape curl along the timer roller and the curl becomes as small as possible along T-tension arm.
4. When the mode is changed from F.FWD to REV x 1 SHUTTLE, check that the curl does not change along the timer roller and T-tension arm. If changed, perform Step 2 through 4 again.
5. Tighten the setscrew.

Note: When replacing the T-tension arm assembly, refer to Section 3-13.

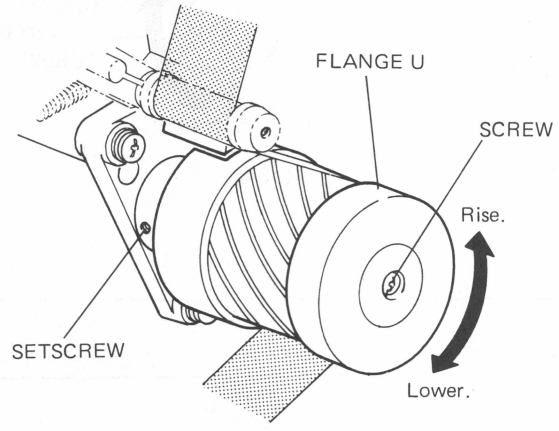


Fig. 10-3-5.

Timer Roller Height Adjustment

Note: The height of the timer roller and T-tension arm influences each other.
If necessary, adjust the height of T-tension arm also.

1. Check that the screw of flange U is tightened.
2. Loosen the setscrew.
3. Set the machine in the REC mode. Adjust the height of the timer roller by turning the flange U so that the tape touches flange U lightly without curl.
4. Tighten the setscrew and check that the screw of flange U is tightened.

Note 1: When replacing the timer roller, perform the replacement referring to pages D-21 to D-22 in section D of manual VOL.3 (for NTSC, PM) or VOL.4 (for PS). After replacement, perform the adjustment of this item, and then perform the servo adjustment in section 11-1.

Note 2: When replacing only the roller section, perform the replacement in according to section 3-23-1.

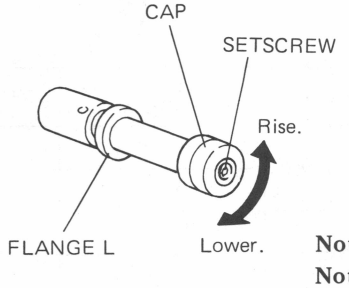


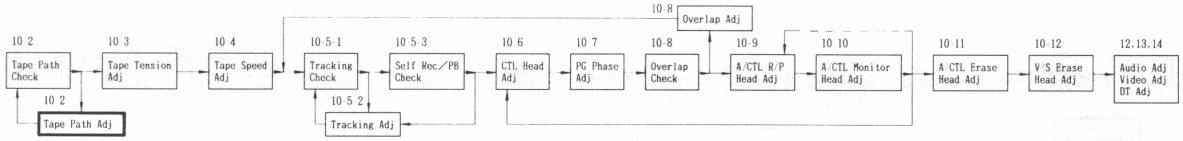
Fig. 10-3-6.

Guide Post 1 Height Adjustment

1. Loosen the setscrew.
2. Set the machine in the REC mode. Adjust the height of the guide by turning the cap so that the tape touches flange L lightly without curl.
3. Tighten the setscrew.

Note: Do not adjust the guide post 1 unless absolutely necessary.

Note: When replacing the components of this guide, refer to Section 6-5.



Taper Guide Height Adjustment

Note : In this section, the height will need not to be adjusted especially unless no tape curls along the guide flange.

1. Loosen the set screw on the top of the taper guide.
2. Turn the cap of the taper guide so that the tape does not curl in REC mode.
3. Fix the cap by tightening the set screw loosened in step 1 with a torque of 7 to 8 kg-cm.

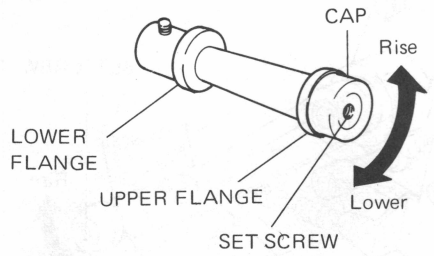


Fig. 10-3-7.

Guide Post 3 Height Adjustment

Note : In this section, the height will need not to be adjusted especially unless no tape curls along the guide flange.

1. Loosen the set screw driven in the upper flange.
2. Turn the height adjustment screw on the top of the upper flange so that the tape does not curl in REC mode.
3. While facing the set screw fastening the upper flange downward, tighten it securely.

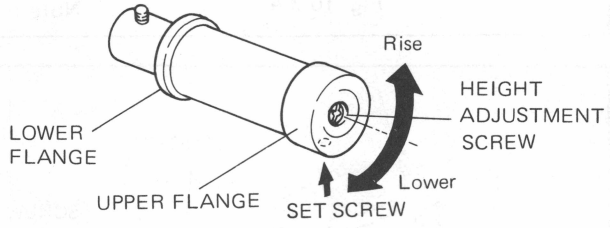


Fig. 10-3-8.

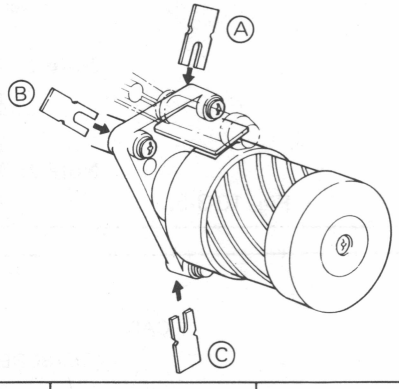
Timer Roller Slant Adjustment

If the height of the tape path along the timer roller varies in each of the REC, F.FWD or REW mode, this adjustment must be performed.

1. Prepare the spacers.

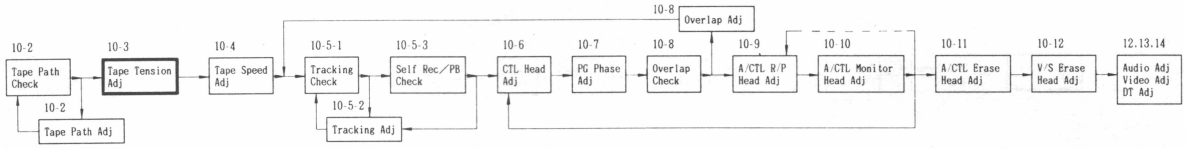
Thickness (mm)	Part No.
0.02	3-651-334-01
0.05	3-651-334-11
0.1	3-651-334-21

2. Insert the spacer into the position shown in Fig. 10-4 so that the height of the tape path in the F.FWD or REW mode is the same as that in the REC mode.



MODE	TAPE POSITION BEFORE ADJ.	SPACER POSITION
F·FWD	LOW	A
	HIGH	B
REW	HIGH	A & B
	LOW	C

Fig. 10-4. Timer Roller Slant Adjustment



10-3. TAPE TENSION ADJUSTMENT

10-3-1. S Side Tape Tension Adjustment

Preliminary Information

A. This is the tape tension (FWD back tension) adjustment in the REC mode.

B. Prepare the tension adjustment tool.
Part No. J-6043-120-A

C. If the specific tape tension is not obtained when the following adjustment has been performed and when it is supposed that the cause is the malfunction of the potentiometer built in the S-tension arm assembly, replace the S-tension arm assembly, referring to section 3-12. The whole assembly should be replaced even if any component of the assembly is worn out or damaged except the guide shaft. If the guide shaft is worn out, replace it referring to section 6-5 or shift the worn surface of the shaft.

Check and Adjustment

1. **Put the S arm adjustment weight on the guide shaft of the S-tension arm. Lift the arm by hand and then take the hand off slowly so that the arm vibrates freely.** Wait until the arm stops naturally.
2. Connect the oscilloscope to TP12 on RL-12 board. And turn on the power of VTR.
3. Check that the voltage at TP12 is 0V ± 0.03V. If necessary, adjust RV12 on RL-12 board.
4. Remove the weight from the S-tension arm and check that the voltage at TP12 is −2.6 ± 0.15V. If necessary, adjust RV1 on TT-01 board.
5. Put the adjustment weight again, and vibrate the arm freely and wait until the arm stops naturally. After the arm was stopped, confirm that the voltage at TP12 is 0 ± 0.03 volt. If not, adjust RV12 again, and then perform step 4. And if RV1 has been adjusted in step 4, perform this step 5 again. Repeat steps 1, 3 and 4 until both the voltage at the time when loading and unloading the weight meet the specifications without any adjustment.

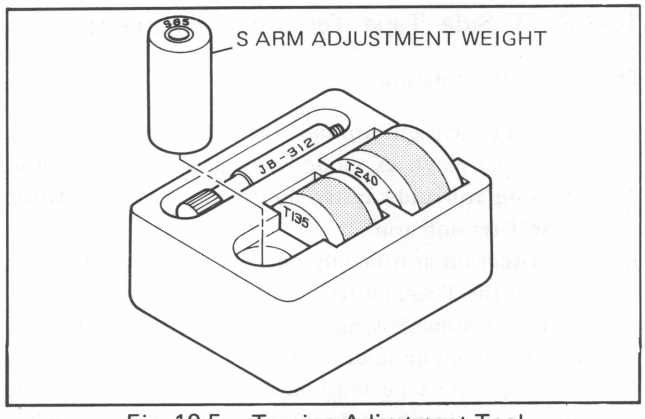


Fig. 10-5. Tension Adjustment Tool

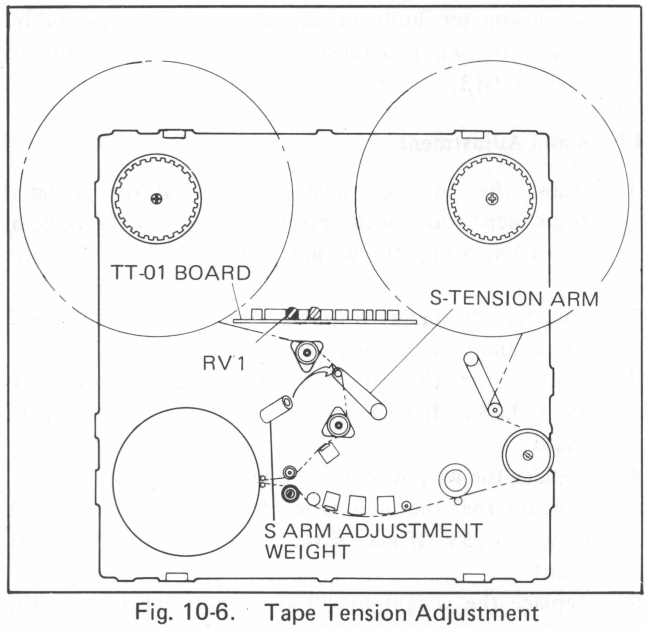


Fig. 10-6. Tape Tension Adjustment

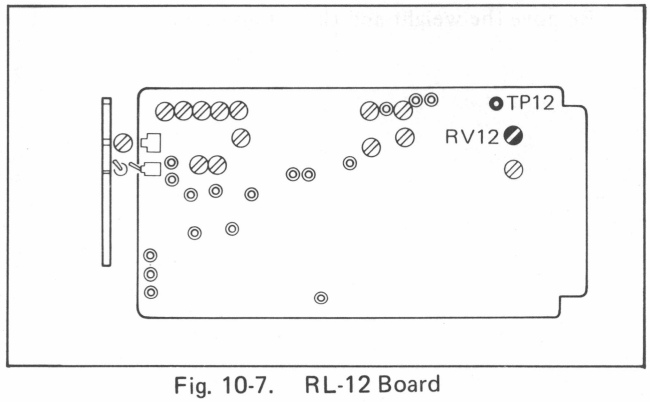
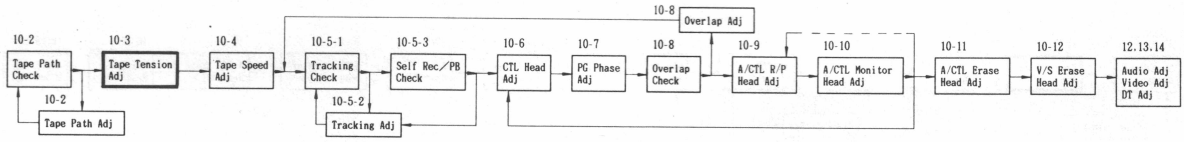


Fig. 10-7. RL-12 Board



10-3-2. T Side Tape Tension Adjustment

Preliminary Information

A. The tape tension around the rotary heads in the record and playback mode is decided by S-reel motor, S-tension arm and capstan motor and it has no relation to the T-tension arm.

B. The T-tension arm mainly operates as the sensor which controls the T-reel motor.
If the adjustment is not correctly performed,the tape may be wound up in disorder.

C. If the specific tape tension is not obtained when the following adjustment has been performed and when it is supposed that the cause is the malfunction of the potentiometer built in the T-tension arm assembly, replace the whole T-tension arm assembly, referring to Section 3-13.

Check and Adjustment

1. Install the T-tension post (the part of the prepared adjustment tool) in the position shown in the right of Fig. 10-8. Apply the weight marked T135 as shown in the figure.
2. Connect the digital voltmeter to TP13 on the RL-12 board, and turn on the power of VTR.
3. Confirm that the indication of the digital voltmeter is 0V ± 0.03V. If necessary, adjust RV13 on the RL-12 board.
4. Replace the weight with the one marked T240.
5. Confirm that the indication of the digital voltmeter is 1.4V ± 0.15V. If necessary, adjust RV2 on the TT-01 board.
6. Replace the weight by T135 weight and perform the confirmation in step 3. Repeat steps 3 to 6 until both the specifications are satisfied without any adjustment.
7. Remove the weight and the T-tension post.

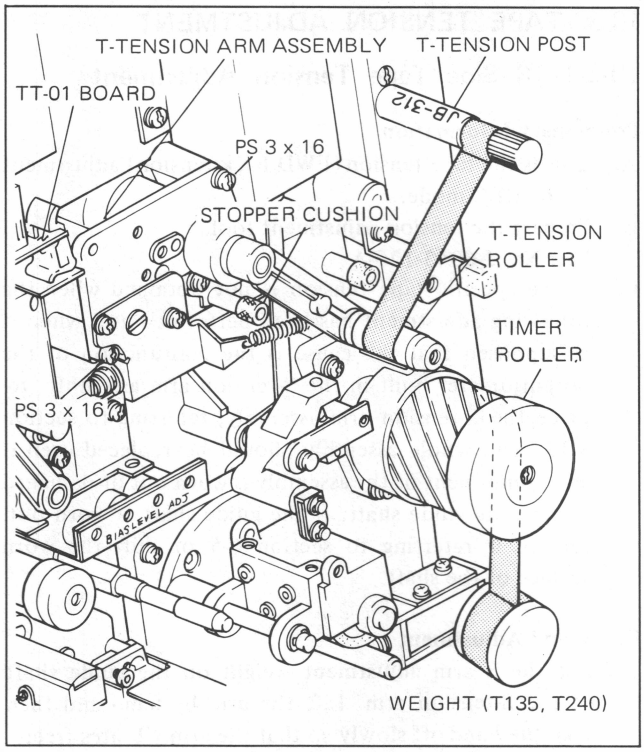


Fig. 10-8. T-Tension Arm Replacement

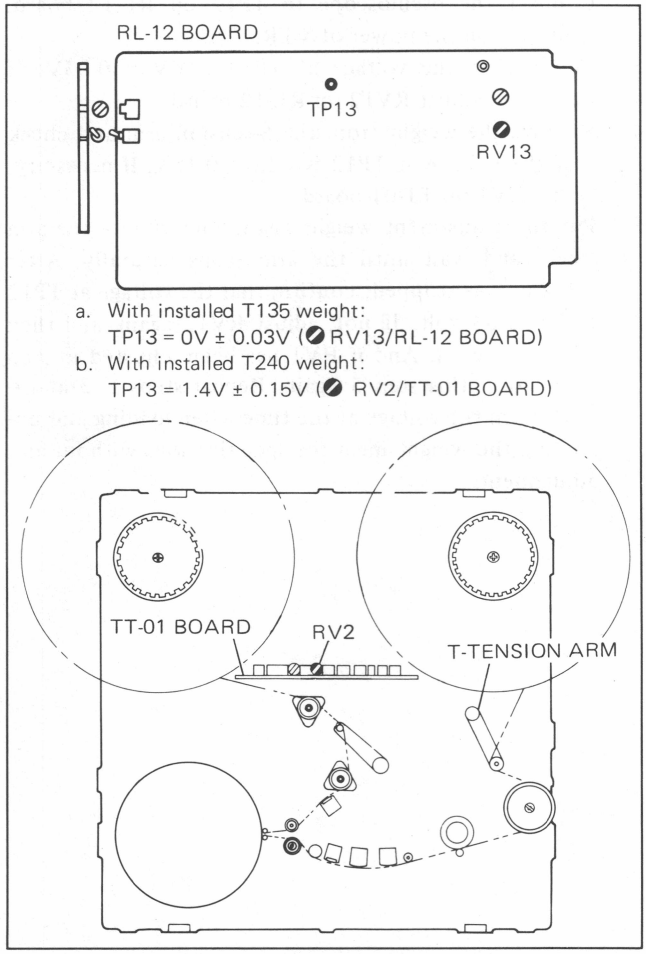
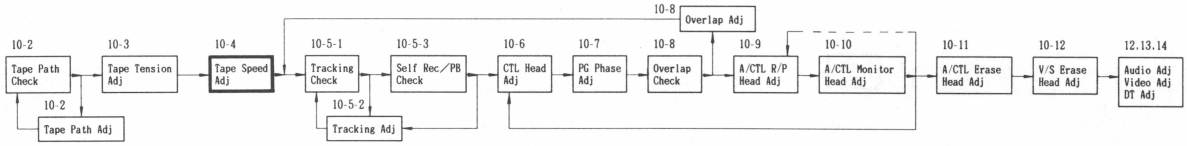


Fig. 10-9. Tension Adjustment



10-4. TAPE SPEED ADJUSTMENT

Preliminary Information

A. This is the tape speed adjustment in the REC mode.

B. This adjustment is required when RV9 on the CD-17 board has been adjusted by mistake, RV9 or the capstan motor has been replaced.

C. This adjustment is to set the FG pulse of the capstan motor to the specified frequency.

Note: There is another way of performing the tape speed adjustment by playing back the alignment tape in the test mode B, but this adjustment should not be used because the alignment tape may be transformed with use.

D. The rotating speed of the capstan could be adjusted by setting the FG pulse to the specified frequency but the tape speed is also in proportion to the diameter of the capstan. If the capstan is worn out extremely, it happens that the tape speed may not be correctly adjusted,

E. When the servo is not locked in the PLAY mode even if this adjustment has been performed, check the pinch roller pressure using sequence established in steps 10 to 14 in Section 3-17, then perform Section 11 Servo System Alignment.

F. For the replacement of the capstan motor, refer to Section 3-17.

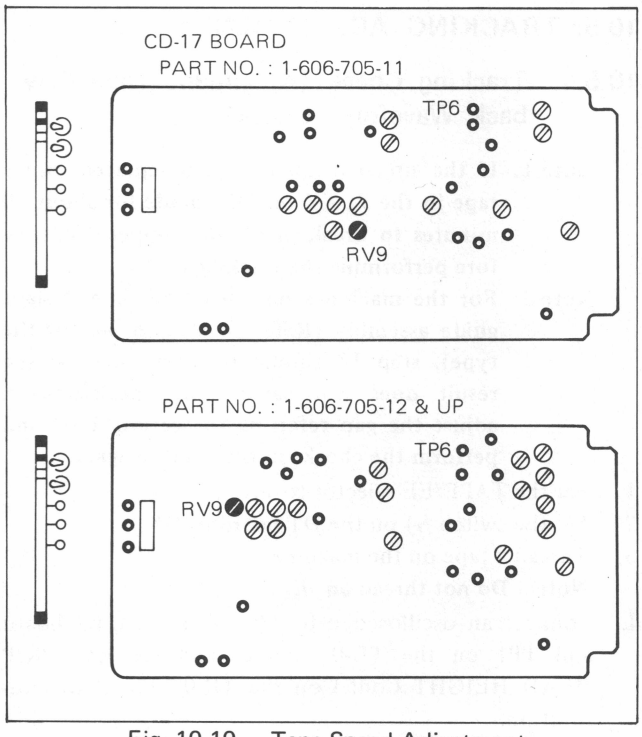
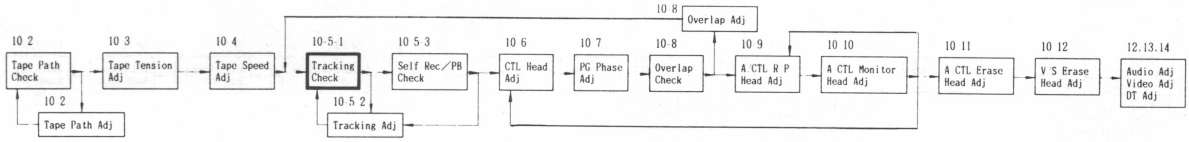


Fig. 10-10. Tape Speed Adjustment

Check and Adjustment

1. Connect the frequency counter to TP6.
2. Thread a tape and record a video signal.
3. While recording, check that the counter reads:
   839.4 Hz ± 0.3 Hz; for NTSC/PAL-M
   825.0 Hz ± 0.3 Hz; for PAL/SECAM
   If necessary, adjust RV9 on the CD-17 board.



10-5. TRACKING ADJUSTMENT

10-5-1. Tracking Check (Alignment Tape Playback Waveform Check)

Note 1: If the upper drum has been replaced, run a tape in the PLAY or REC mode for about 20 minutes to break in the new upper drum before performing the tracking check.

Note 2: For the machines installed type A exit slant guide assembly (Refer to section 3-8 for the type), step 15 should be performed. If the result does not satisfy the specifications, adjust the gap referring to section 3-8-3 and perform the checks in this section again.

1. Set the TAPE/EE selector to TAPE.
2. Set the switch S4 on the DT board to ON.
3. Thread a tape on the machine.
   Note: Do not thread an alignment tape.
4. Connect an oscilloscope to TP5 on the EQ-02 board and TP1 on the TD-07 board, and set RV1 (R/P HEAD HEIGHT Cont.) on the TD-07 board to mid-rotation.
5. Set the machine in the REC mode. Turn RV2 on the TD-07 board so that the amplitude at TP5 on the EQ-02 board is maximum. Then confirm that the voltage at TP1 on the TD-07 board is 0 ± 100mV.
6. Connect the oscilloscope TP1 and TP2 on the EQ-02 board.
7. Change the tape for an alignment tape.
8. Set the R/P MODE selector to FIELD or FRM and set the ADV switch on the CD-17 board to OFF.
9. Play back the alignment tape.
10. Check that the tape touches the upper flange of the taper guide lightly and the tape does not curl along the flange.
    If not, perform the adjustment procedures.
11. Check that the tape touches the lower flange of guide post 3 lightly and the tape does not curl along the flange. If not, perform the adjustment procedures.
12. Play back the WHITE segment of the alignment tape and maximize the RF amplitude by turning TRACKING knob.
13. Check that the VIDEO and SYNC RF waveform show the specified value in Fig. 10-11-1. If it is satisfied, reset the switch S4 on the DT board to OFF.
14. Push TRACKING knob and check that the RF waveform does not vary. If the waveform varies, the CTL head position adjustment is required.
15. By performing the following two steps, check the gap between the upper drum and the guide post where is 1 mm apart from the guide flange as shown in Fig. 10-11-2.
    ① 0.08-mm-gauge can be passed.
    ② 0.10-mm-gauge cannot be passed.

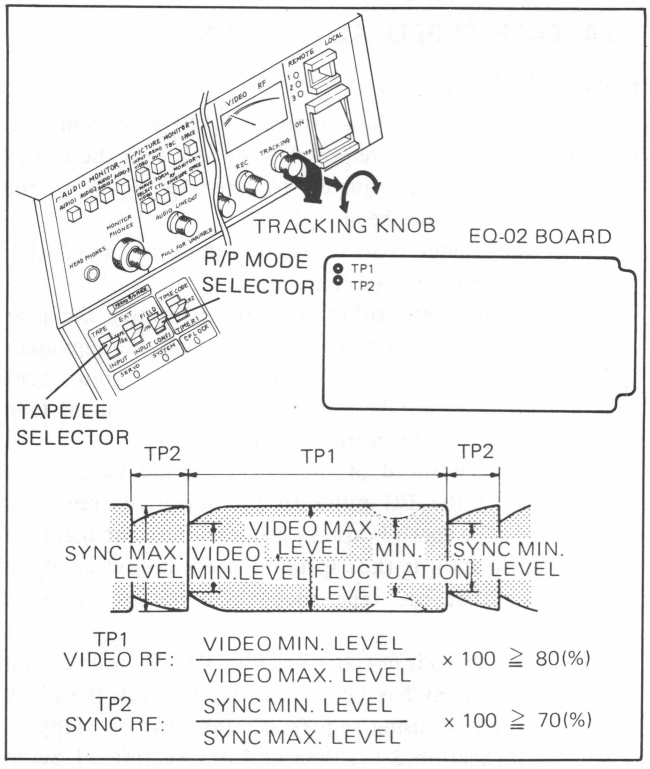


Fig. 10-11-1. Alignment Tape Playback Check

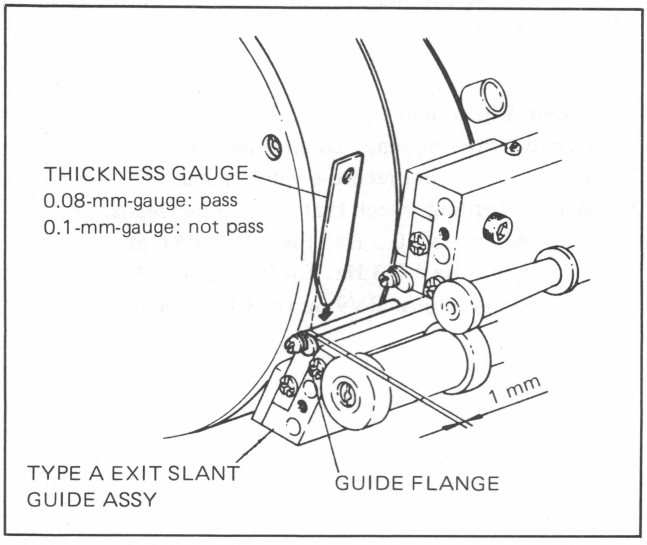
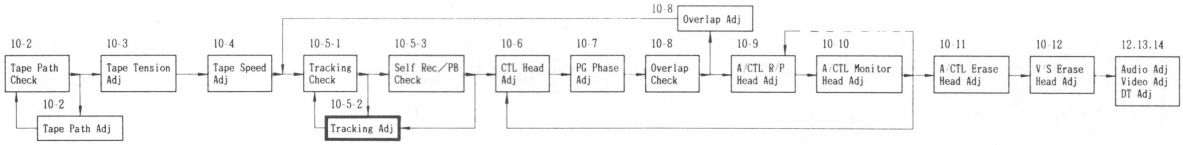


Fig. 10-11-2. Checking Gap near to Type A Exit Slant Guide Assy



10-5-2. Tracking adjustment

Preliminary Information

A. This adjustment is to make the heads trace the record pattern of the alignment tape correctly and to make the heads come into contact with the tape properly so that the tape interchangeability is maintained.

B. Adjustment points

① The height or slant of the taper guide, slant guides (entrance and exit) and guide post 3 must be adjusted.

② The RF waveform of the tape entrance side must be adjusted first, and then that of the tape exit side must be adjusted.

③ Each height of the taper guide and entrance slant guide should be adjusted alternately while checking the RF waveform.

④ Before turning the slant guide adjustment screw, push the tape lightly and check the direction in which the slant guide must be moved.

⑤ For the relation between the turning direction of the adjustment screw and moving direction of the slant guide, see Fig. 10-13.

⑥ Make as much of the tracking adjustment as possible by adjusting the slant of the slant guide. Be careful that the guide flange does not press the tape excessively when turning the height adjustment screw.

⑦ Each height of the guide post 3 and exit slant guide should be adjusted while checking the RF waveform.

C. To adjust the height and slant, use phillips screwdriver for M2.6.

D. If the tracking cannot be adjusted correctly owing to the wear of the entrance slant guide, exit slant guide or the tape guide section of the head drum assembly, replace the part in acordance with the following section.

Head drum assembly: Section 3-6
Entrance slant guides assembly: Section 3-8
Exit slant guide assembly: Section 3-8
Components of the slant guide assembly: Section 6-6

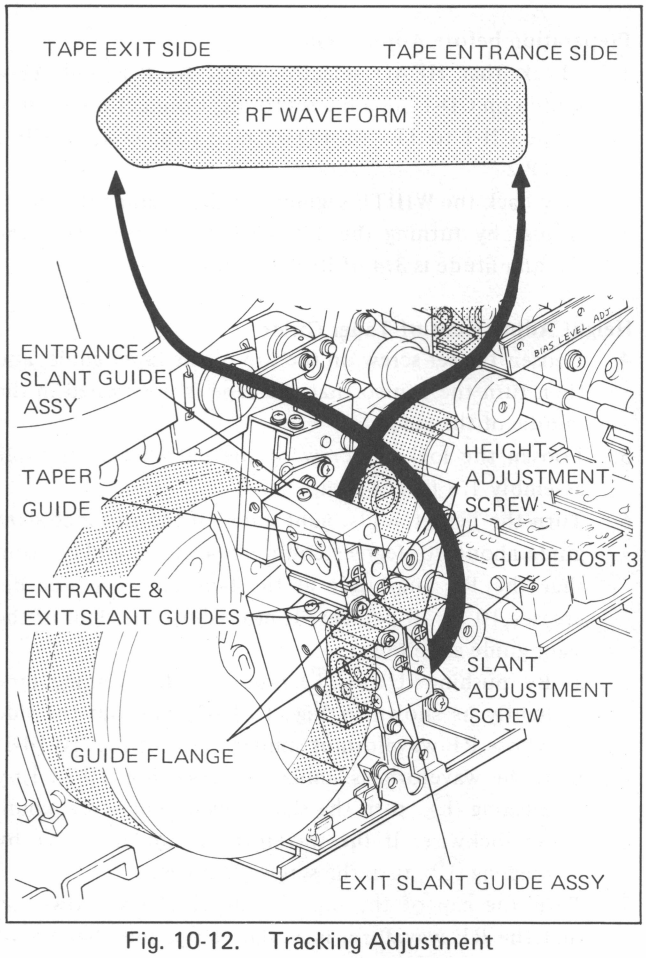


Fig. 10-12. Tracking Adjustment

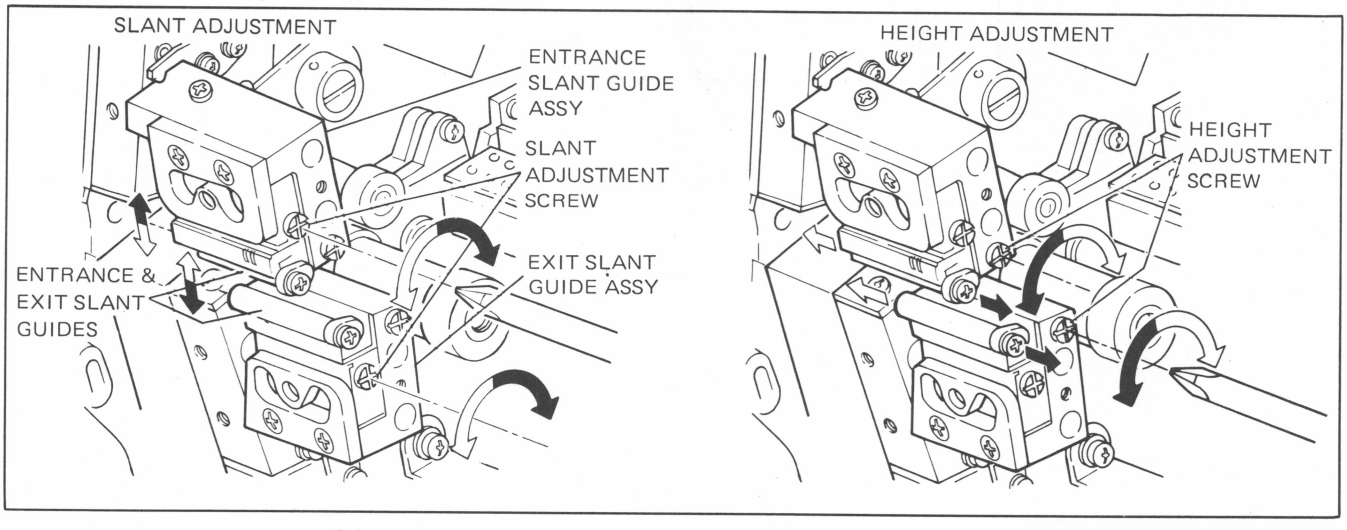
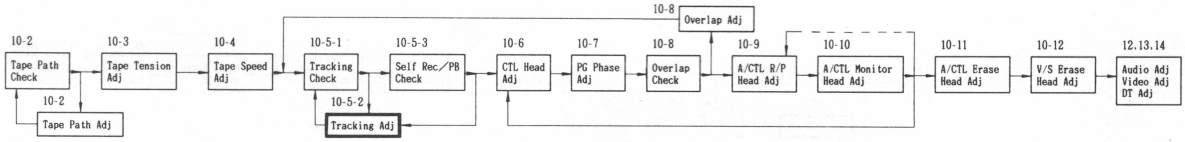


Fig. 10-13. Movement of Adjustment Screws and Slant Guides



Preparation before Adjustment

1. Check that HEAD selector is set to R/P and ADV switch on CD-17 board is set to off. Connect the oscilloscope CH-1 to TP1 on EQ-02 board and connect CH-2 to TP-2.
2. Play back the WHITE segment of the alignment tape.
3. Adjust by turning the TRACKING knob so that the RF amplitude is 3/4 of its maximum.

Height Adjustment of Taper Guide

4. Loosen the set screw on the top of the taper guide, and then turn the cap so that the tape is positioned in the middle of the guide.
5. Loosen the locking screw of the entrance slant guide assembly 1/8 to 1/4 turn.
6. Turn the height adjustment screw of the entrance slant guide about 90 degrees counterclockwise, and confirm that the RF amplitude at the tape entrance side decreases 10 to 20 percent. If not, adjust the slant of the slant guide as follows.
   a By pushing Ⓤ or Ⓛ point of the running tape lightly as shown in Fig. 10-14-2, find out the side whose RF waveform is similar to (a) of Fig. 10-14-1.
   b If the waveform is similar to (a) of Fig. 10-14-1 by pushing Ⓛ, turn the slant adjustment screw counterclockwise. If the waveform is similar to (a), by pushing Ⓤ, turn the screw clockwise.
7. Turn the cap of the taper guide clockwise slowly so that the RF waveform is as flat as possible. See (b) of Fig. 10-14-1.
8. Fix the cap by tightening the set screw on the top of the cap with a torque 7 to 8 kg-cm.
9. Confirm that the tape touches the upper flange of the taper guide but the tape does not curl along the flange.

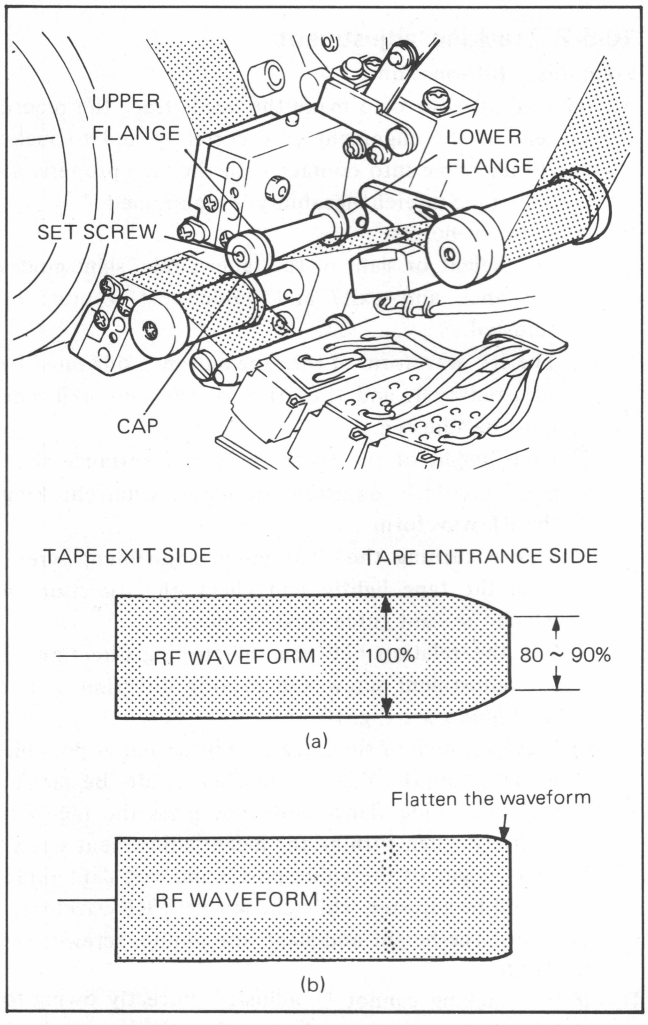
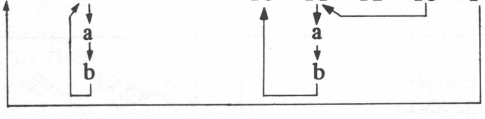
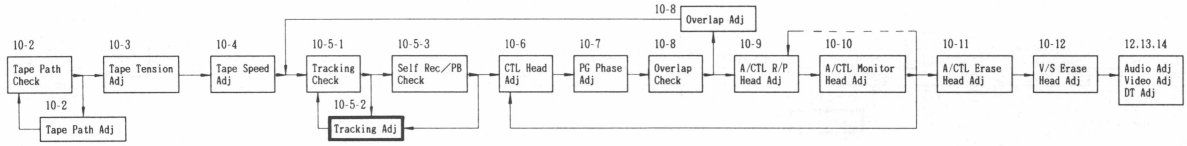


Fig. 10-14-1. Height Adjustment of Taper Guide

Note: The adjustment order of the RF waveform on the tape entrance side is as follows;

Steps 1→2→3→4→5→6→7→8→9→10→11→12→13→14→ RF waveform adjustment on the tape exit side.





Adjustment of Entrance Slant Guide

10. Check that the tape does not curl along the guide flange of the entrance slant guide. If the tape curls, turn the height adjustment screw counterclockwise.
11. Check that the RF waveform is flat. If it is not, adjust the slant of the entrance slant guide by performing following a and b steps.
    Repeat these steps until the RF waveform becomes as flat as possible and the tape does not curl along the guide flange.
    a. Lightly push Ⓤ or Ⓛ side of the tape shown in Fig. 10-14-2 and find out the side whose RF waveform on the tape entrance side becomes flat.
    b. If the RF waveform flattens when the Ⓛ side of the tape is pushed, turn the slant adjustment screw counterclockwise and if the waveform flattens when the Ⓤ side of the tape is pushed, turn the adjustment screw clockwise.
12. Finally adjust again by turning the height adjustment screw so that the tape does not curl along the guide flange and the RF waveform is flat.
13. Tighten the locking screw of the entrance slant guide assembly and check that the RF waveform remains flat. If the RF waveform is varied, loosen the locking screw again and proceed to step 11.
14. Confirm that the tape touches the upper flange of the taper guide and the tape does not curl. If not, proceed to step 4 again.

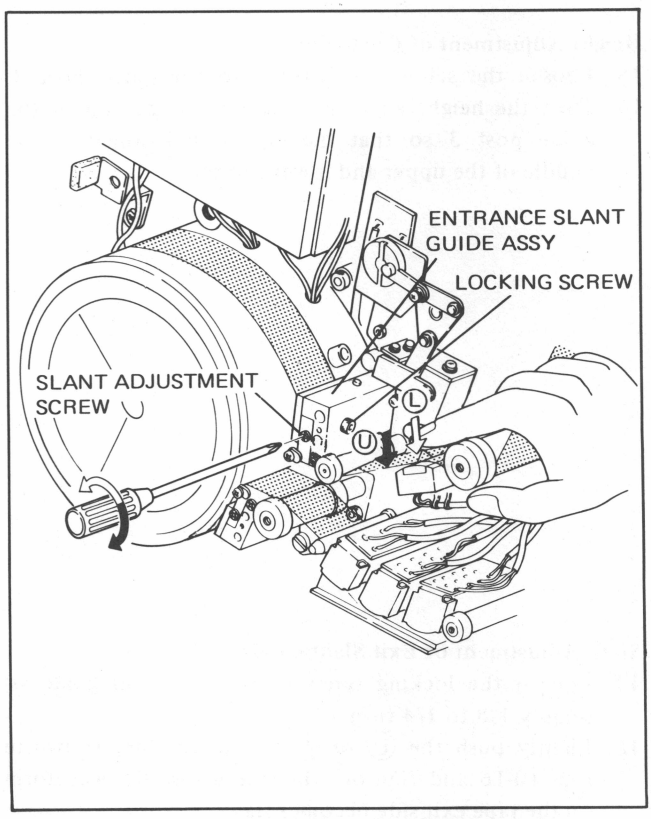


Fig. 10-14-2. Slant Adjustment of Entrance Slant Guide

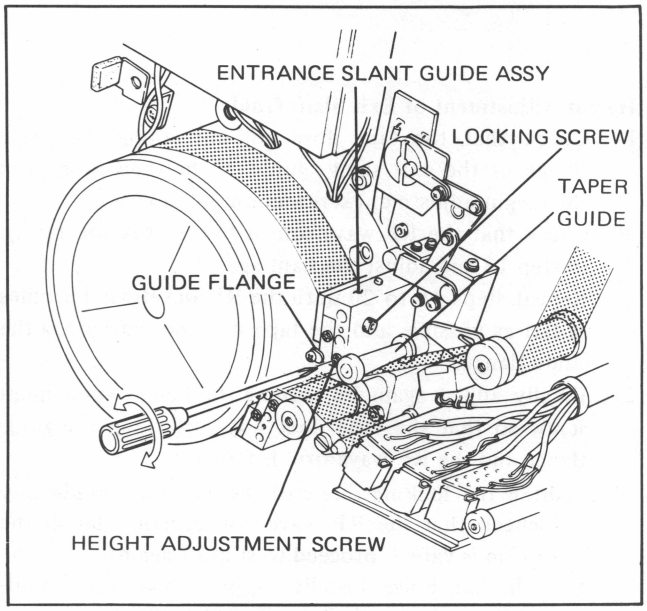
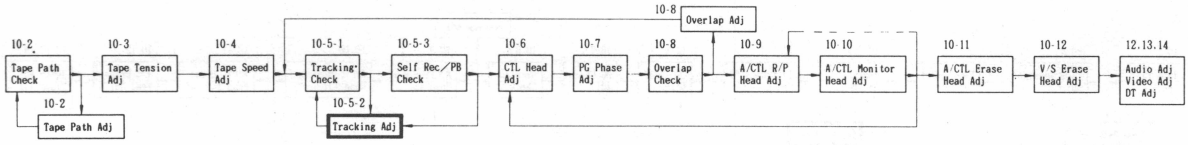


Fig. 10-15. Height Adjustment of Entrance Slant Guide



Height Adjustment of Guide Post 3

15. Loosen the set screw driven into the guide post 3.
16. Turn the height adjustment screw on the top of the guide post 3 so that the tape is positioned in the middle of the upper and lower flanges.

Slant Adjustment of Exit Slant Guide

17. Loosen the locking screw of the exit slant guide assembly 1/8 to 1/4 turn.
18. Lightly push the Ⓤ or Ⓛ side of the tape shown in Fig. 10-16 and find out the side whose RF waveform on the tape exit side becomes flat.
    If the RF waveform flattens when the Ⓛ side of the tape is pushed, turn the slant adjustment screw counterclockwise and if the waveform flattens when the Ⓤ side is pushed, turn the adjustment screw clockwise.

Height Adjustment of Exit Slant Guide

19. Check that the tape does not curl along the guide flange of the exit slant guide. If the tape curls, turn the height adjustment screw counterclockwise.
20. Check that the RF waveform is flat. If it is not, return to step 18 and adjust the slant again.
    Repeat steps 18 to 20 until the RF waveform becomes as flat as possible and the tape does not curl along the guide flange.
21. Finally adjust again by turning the height adjustment screw so that the tape does not curl along the guide flange and the RF waveform is flat.
22. Tighten the locking screw of the exit slant guide assy and check that the RF waveform remains flat. If the waveform is varied, proceed to step 17 again.
    For the machines installed type A exit slant guide assembly, perform step 15 in Tracking Check.
23. While confirming that the RF waveform does not vary, turn the height adjustment screw of the guide post 3 so that the tape touches the lower flange of the guide post 3.
24. Tighten the set screw which was loosened in step 19.

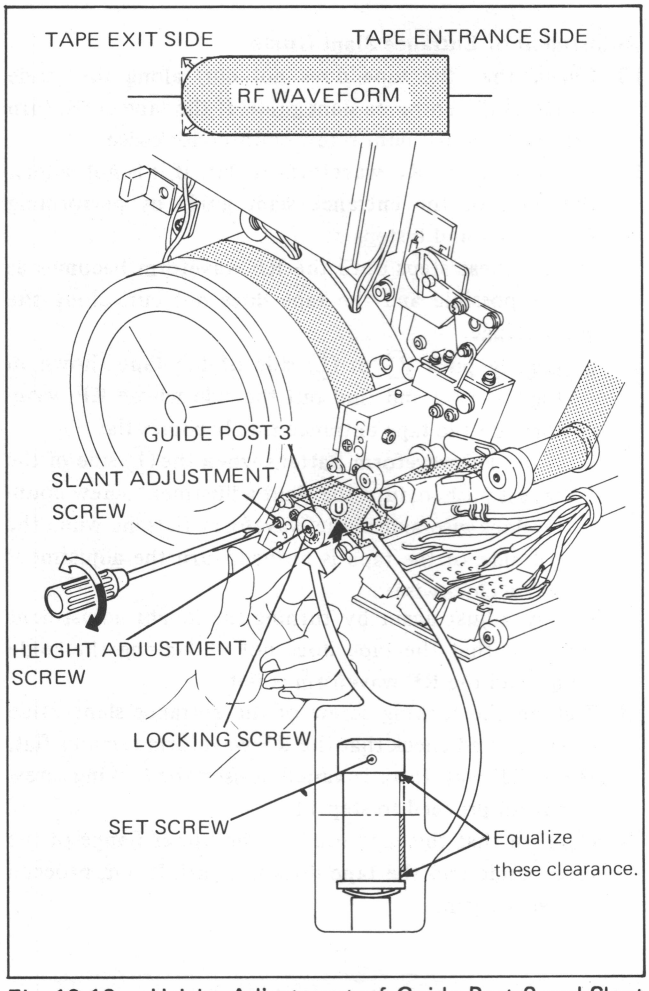


Fig. 10-16. Height Adjustment of Guide Post 3 and Slant Adjustment of Exit Slant Guide

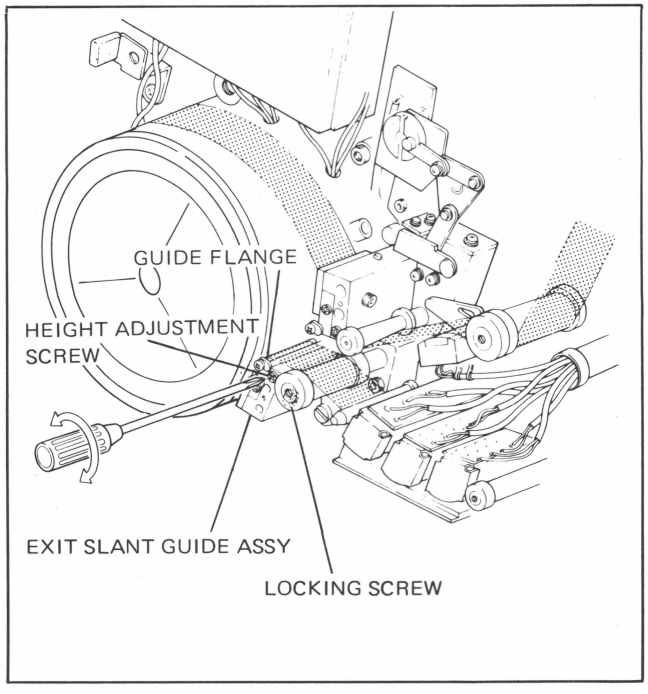
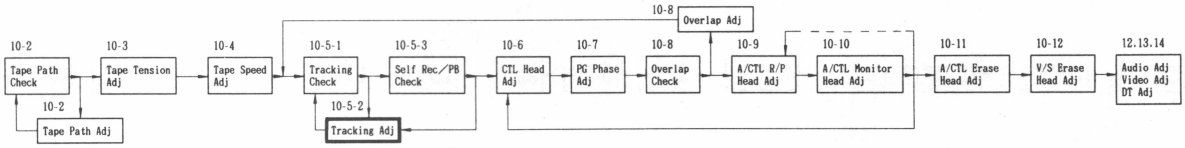


Fig. 10-17. Height Adjustment of Exit Slant Guide



Check after Adjustment

25. Thread a recorded tape.
    Note: Use the worn-out tape since the tape may be damaged.
26. Set the machine in the STANDBY mode.
27. Set the tape running onto the guide flange of the exit slant guide about 1 mm and tighten the tape by turning tape take-up reel by hand.
28. Set the machine in the PLAY mode and check that the tape forced to run onto the guide flange is restored in the normal tape running. If the tape is not restored in the normal tape running, check the following;
    (1) Is the tape tension correct?
    (2) Does the guide flange press too strongly against the tape?
    (3) Is the slant of the guide correct?

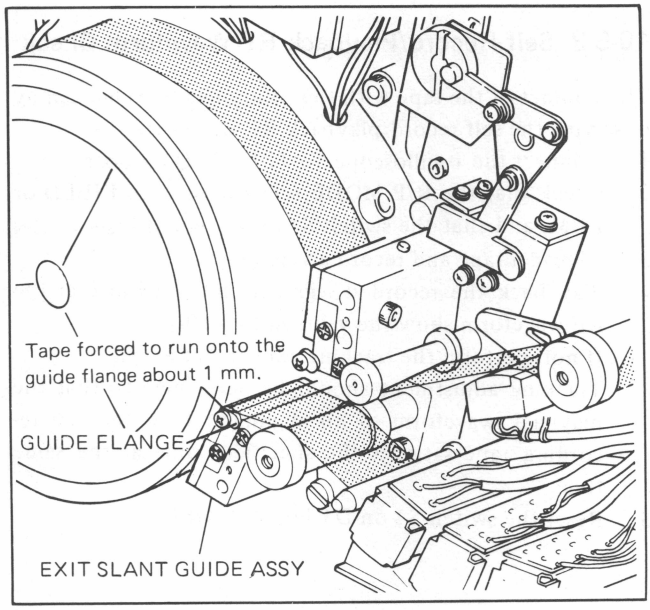
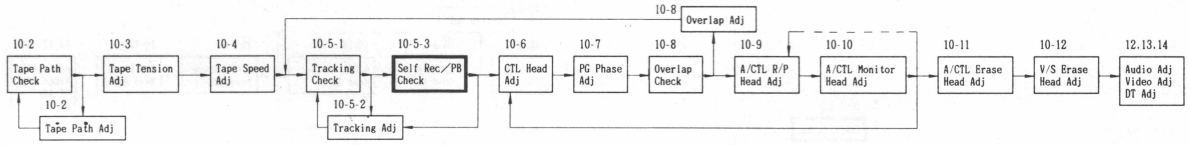


Fig. 10-18. Check of Tape running onto Guide Flange

Note: The adjustment order of the RF waveform on the tape exit side is as follows;

RF waveform adjustment of entrance side →15→16→17→18→19→20→21→22→23→24→25→26→27→28→END



10-5-3. Self Record/Playback RF Waveform Check

The contact of the tape with the rotary heads is checked by observing the self record/playback RF waveform.

1. Connect the oscilloscope to TP1 on EQ-02 board.
2. Check that the R/P MODE selector is set to FIELD or FRM, and that the switch S4 on DT board is set to ON.
3. Thread a tape and record a video signal.
4. Play back the recorded segment and confirm that the RF waveform show the value in Fig. 10-19.
   If not, perform the tracking adjustment again.
   Tracking adjustment should be performed so that the playback waveform of an alignment tape and self recording tape satisfies the specified value at the same time.
5. Reset the switch S4 on DT board to OFF.

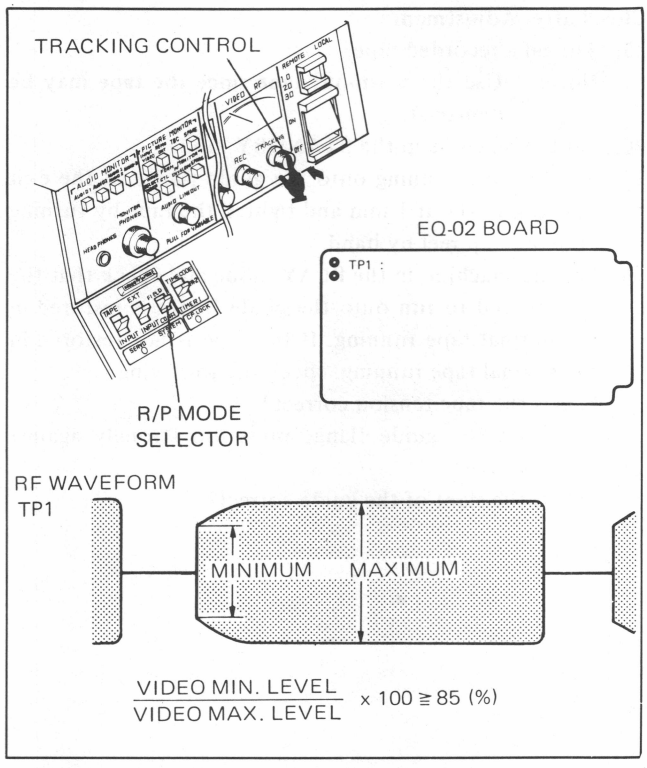
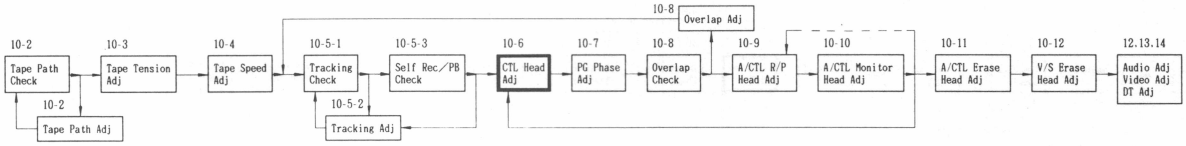


Fig. 10-19. Self Record/Playback RF Waveform Check



10-6. CTL HEAD POSITION ADJUSTMENT

A. If CTL head has been mounted on the incorrect position, the tape recorded by any other machine can not be played back correctly on this machine.

B. Since the PG phase deviates a great deal when CTL head is moved, the PG phase must be always adjusted after performing the adjustment of CTL head.

C. Before performing this adjustment, the DT head height must be adjusted correctly.

Check

1. When the DT head height has not been adjusted, perform the step 1 to 5 in the section 10-5-1.
2. Check that the R/P MODE selector is set to FIELD or FRM and that the switch S4 on DT board is set to ON.
3. Confirm that ADV switch on CD-17 board is set to off and connect the oscilloscope to TP1 on EQ-02 board.
4. Play back the WHITE segment of the alignment tape.
5. Adjust by turning TRACKING knob so that the RF waveform shows maximum and check that the RF waveform remains unchanged when the TRACKING knob is pushed at the maximum RF amplitude. If the RF waveform changes, perform the following adjustment.

Adjustment

6. Remove the head shield cover.
7. Loosen the four screws fixing the head base 1/4 to 1/2 turn.
8. Check that TRACKING knob has been pushed and playback the WHITE segment of the alignment tape.
9. Insert the hexagonal screwdriver (2.5 mm to the opposite side) into the hole shown in Fig. 10-21. Pushing the head base in the direction of the arrow by hand, move the screwdriver right or left so that the RF waveform shows maximum.
10. Tighten the four screws loosened at Step 7.
11. Check that there is no clearance between pins and the head base shown in Fig. 10-21.
12. Check by turning TRACKING knob that the RF waveform does not change when the knob is pushed at the maximum RF amplitude.
    If it changes, repeat Steps 7 to 12.
13. Mount the head shield cover.
14. Set the switch S4 on DT board to OFF.

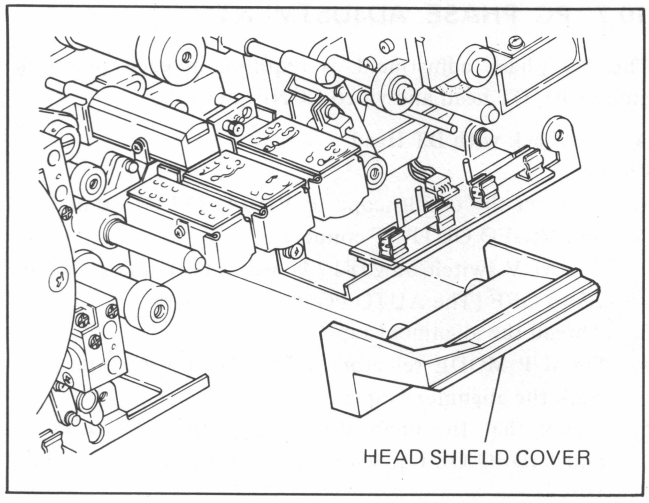


Fig. 10-20. Head Shield Cover Removal

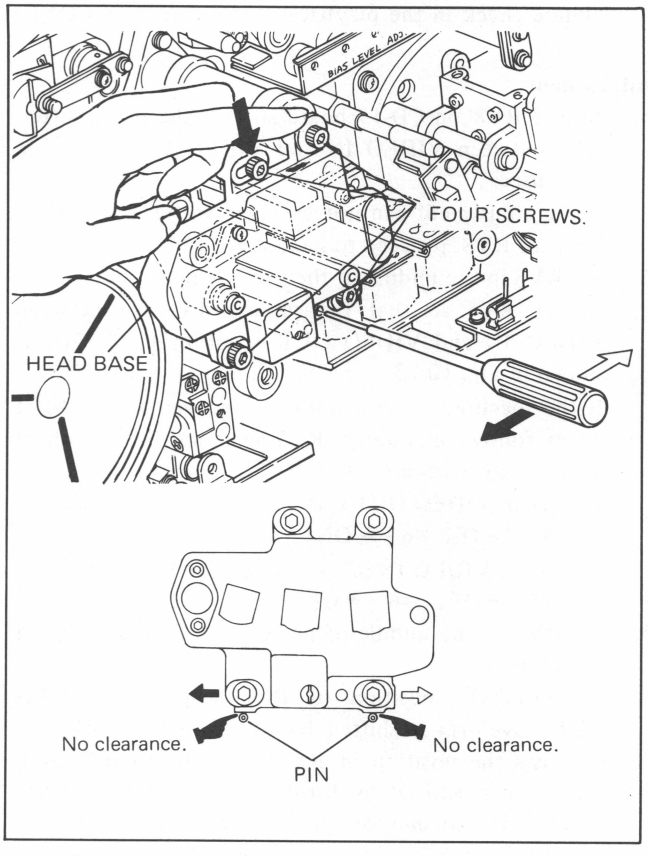
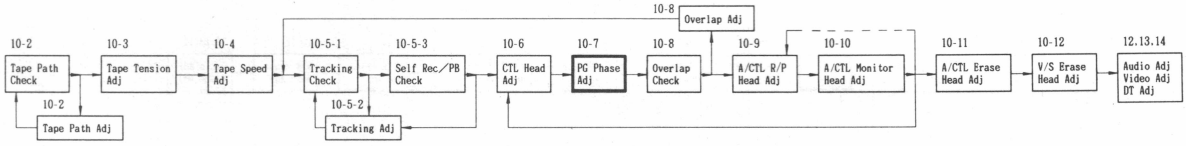


Fig. 10-21. CTL Head Position Adjustment



10-7. PG PHASE ADJUSTMENT

The PG phase adjustment is required in each playback mode with DT head and video CONFI head.

A. Playback with DT Head

Check

1. Connect the oscilloscope to VIDEO INPUT connector and VIDEO OUTPUT connector.
2. Set ADV switch on CD-17 board to OFF and set #2 of S3 to OFF (The AUTO PG does not operate.).
3. Thread the alignment tape.
4. Set R/P MODE selector to FIELD or FRM and play back the alignment tape.
5. Check that the phase difference between VIDEO IN and VIDEO OUT is within 1 ± 1 μsec, as shown in Fig. 10-22.

   If the specified value is not obtained, perform the following adjustment.

   If the specified value is obtained, proceed to Step 11 "Phase check in the playback mode with video CONFI head".

Adjustment

6. Adjust RV8 on CD-17 board so that the phase difference between VIDEO IN and VIDEO OUT is within 1 ± 1 μsec.

   If the adjustment can not be made within the variable range of RV8, proceed to next step.
7. Set RV8 in the middle of the variable range.
8. Adjust RV5 so that the phase difference between VIDEO IN and VIDEO OUT is within +/−0.75H, as shown in Fig. 10-23.

   If the specified value is not obtained, set #5 and #6 of S3 as follows and adjust RV5 again so that the phase difference is within +/−0.75H.

   ⓐ When VIDEO OUT is in advance of VIDEO IN;
   #5 → ON, #6 → ON

   ⓑ When VIDEO IN in advance of VIDEO OUT;
   #5 → OFF, #6 → OFF
9. Set RV5 in the middle of positions A and B as shown in Fig. 10-23.

   A shows the position of RV5 when the VIDEO OUT waveform is shifted by turning RV5 clockwise. B shows the position of RV5 when the VIDEO OUT waveform is shifted by turning RV5 cunterclockwise. Connect the oscilloscope to TP15 and TP13 on CD-17 board.

   Adjust RV5 so that the positive-going edge at TP15 coincides with the nearest leading edge at TP13.
10. Adjust RV8 again so that the phase difference between VIDEO IN and VIDEO OUT is within 1 ± 1 μsec.

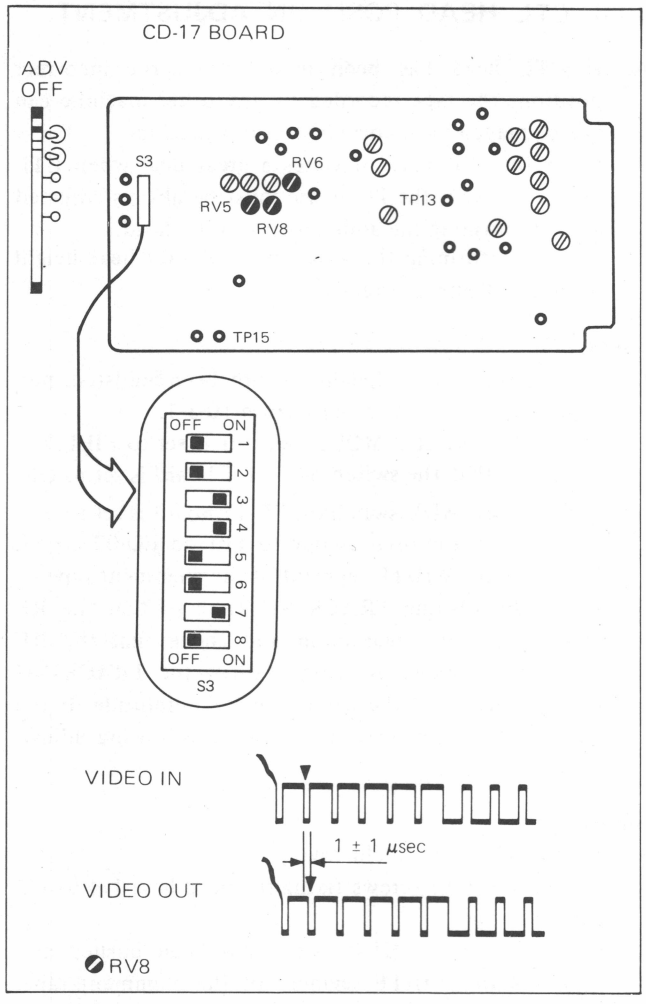
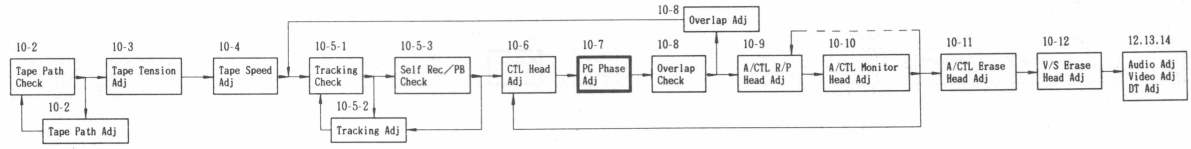


Fig. 10-22. PG Phase Adjustment in the Playback Mode with DT Head



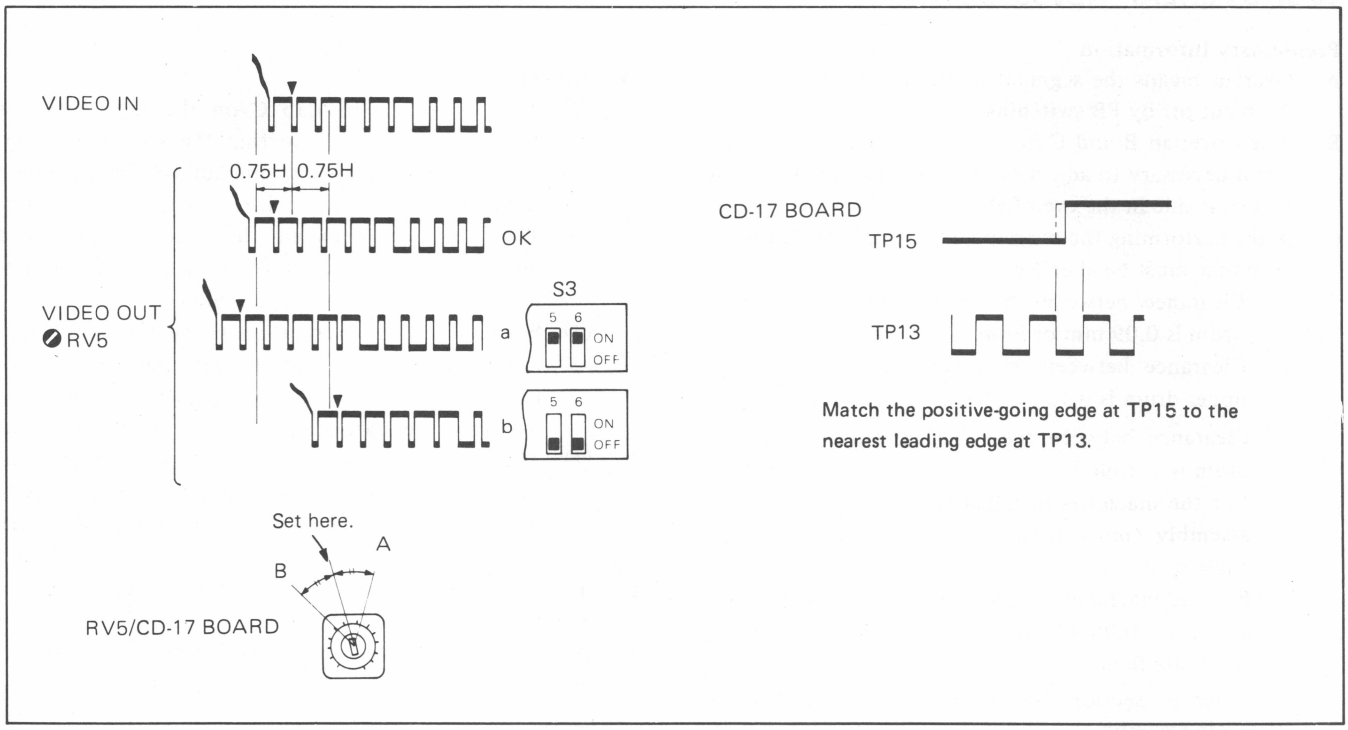


Fig. 10-23. PG Phase Adjustment in the Playback Mode with DT head.

B. Playback with Video CONFI Head

Check

11. Set R/P MODE selector to CONFI and playback the alignment tape.
12. Check that the phase difference between VIDEO IN (CH-1) and VIDEO OUT (CH-2) is within 1 ± 1 μsec. If the specified value is not obtained, perform the following adjustment.
    If the specified value is obtained, proceed to step 14.

Adjustment

13. Adjust RV6 on CD-17 board so that the phase difference between VIDEO IN (CH-1) and VIDEO OUT (CH-2) is with in 1 ± 1 μsec.
14. Reset #2 of S3 on CD-17 board ON (The AUTO PG operates.).

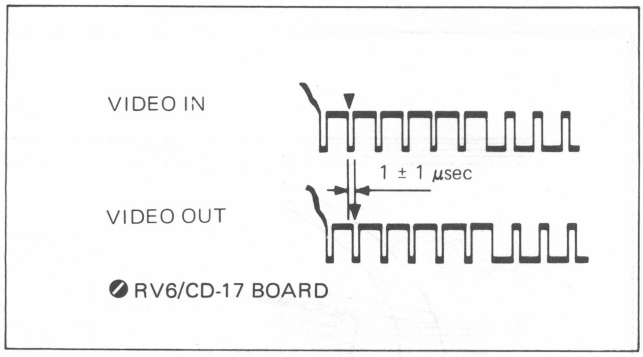
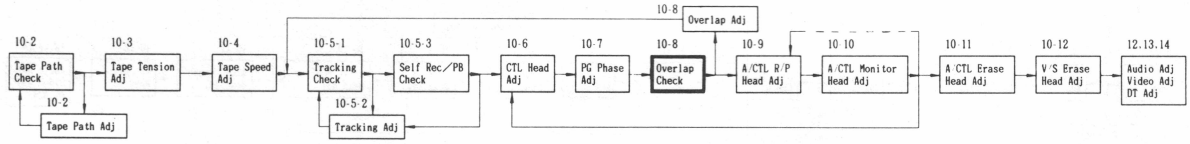


Fig. 10-24. PG Phase Adjustment in the Playback Mode with Video CONFI Head



10-8. OVERLAP ADJUSTMENT

Preliminary Information

A. Overlap means the segment of the playback RF waveform cut off by PB switching.

B. When overlap B and C in the odd field are adjusted, it is not necessary to adjust dropout A and overlap on the tape exit side in the even field.

C. After performing the overlap adjustment, the following clearance must be checked.

① Clearance between the guide bracket and upper drum is 0.09 mm or more.

② Clearance between the fence (entrance side) and upper drum is 0.15 +/– 0.05 mm. See Fig. 10-27-2.

③ Clearance between the exit slant guide and upper drum is as follows.

For the machines installed type B exit slant guide assembly: more than 0.25 mm at the middle of guide post.

For the machines installed type A exit slant guide assembly: 0.09 +/– 0.01 mm at 1 mm apart from the guide flange.

Refer to section 3-8 for the type of exit slant guide assembly.

Note: With power off, turn the threading motor of the movable guide with a flat-brade screwdriver so that the movable guide is closed, and check the clearance.

D. Adjustment Points

① When adjusting overlap C on the tape entrance side, loosen screw N so that the slant guide assy turns around screw M, and adjust the clearance between the guide bracket and upper drum.

② The clearance between the guide bracket and upper drum can be adjusted by turning the set-screw driven into the taper guide.

③ When adjusting overlap B on the tape exit side, loosen screw P so that the exit slant guide assy turns around screw Q, and adjust the clearance between the exit slant guide and upper drum.

④ The clearance between the exit slant guide and upper drum can be adjusted by turning the set-screw driven into the guide post 3 (or guide roller 3).

E. The thickness gauge is required for this adjustment.
Sony Part No. J-6041-670-A

F. After performing the overlap adjustment, be sure to check the tracking waveform in Section 10-5-1.

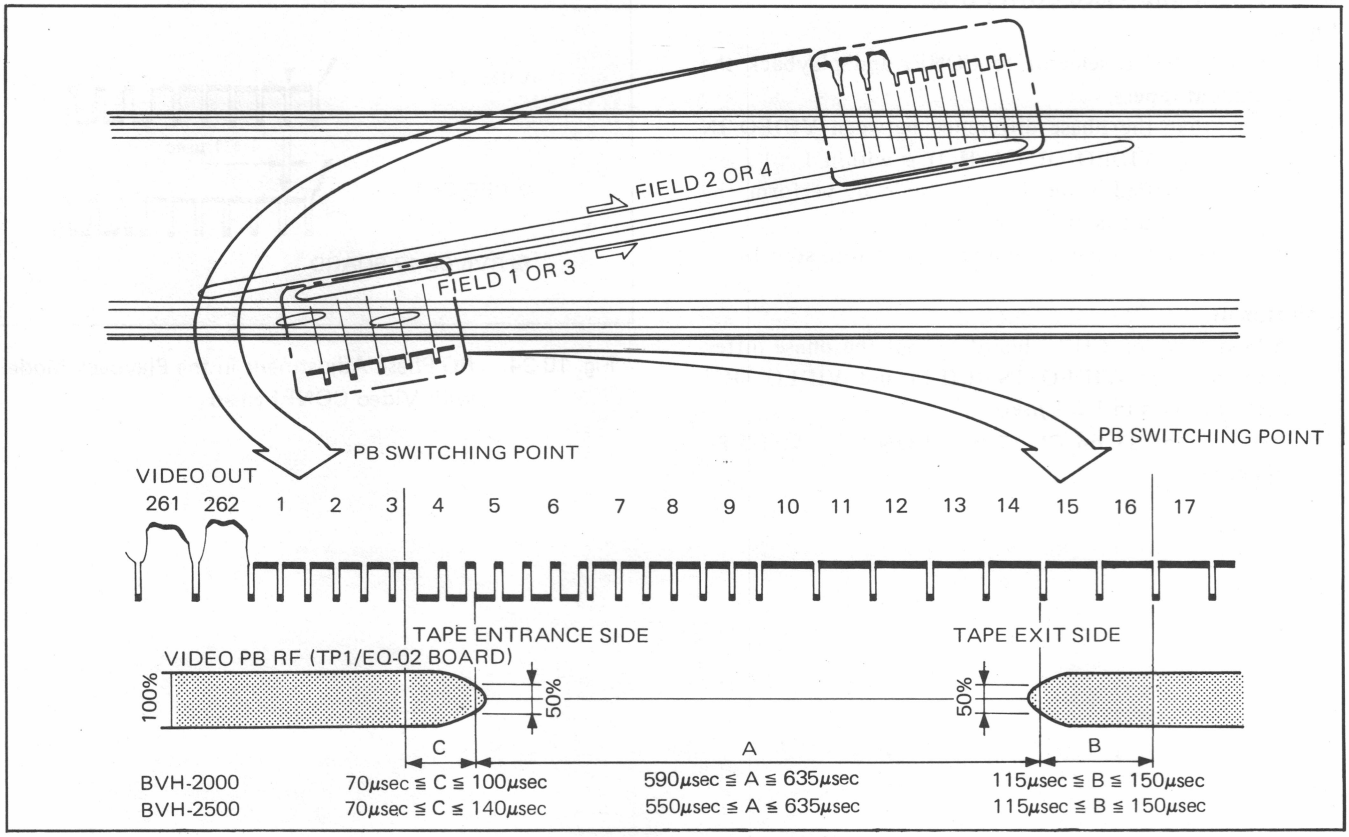


Fig. 10-25. Overlap Adjustment

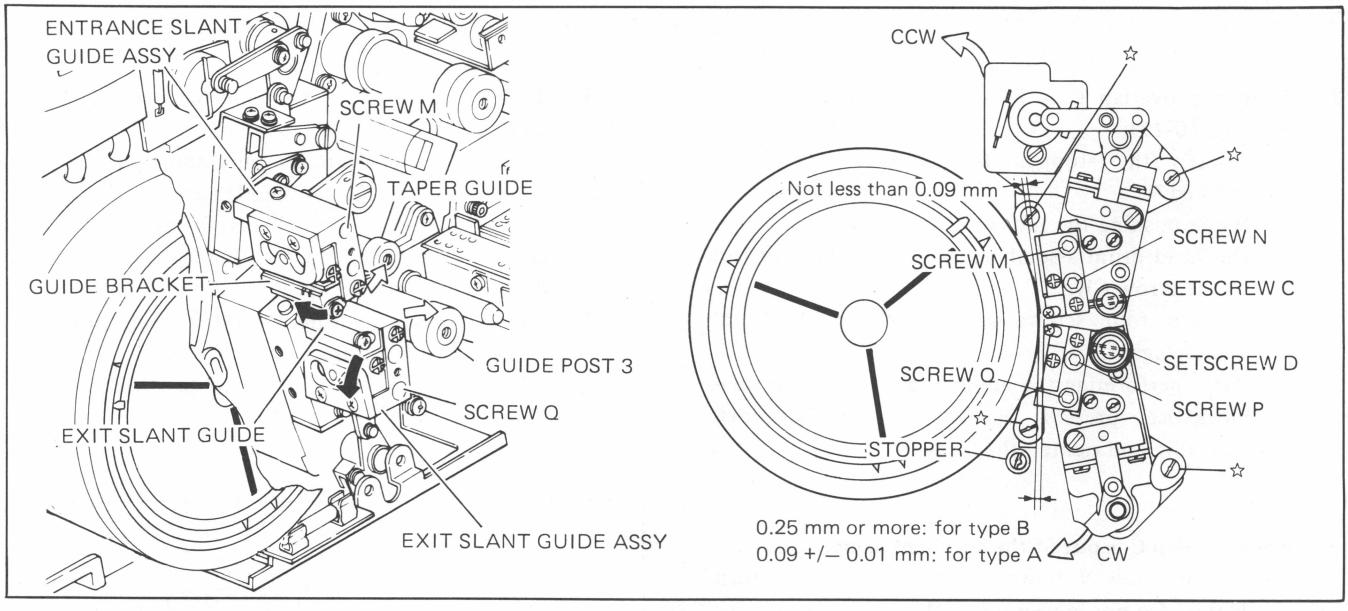


Fig. 10-26. Overlap Adjustment

Check

1. Connect the oscilloscope to TP1 on EQ-02 board and VIDEO OUTPUT connector.
2. Thread a tape.
3. Set R/P MODE selector to FIELD or FRM.
4. Record a video signal.
5. Play back the recorded segment and check that overlap B and C is within the range shown in Fig. 10-25.

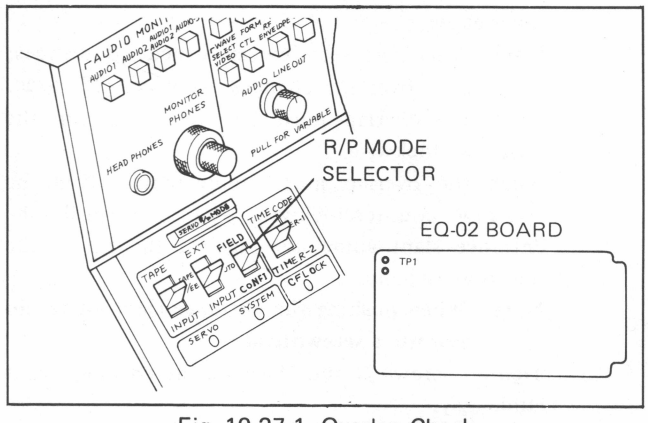


Fig. 10-27-1. Overlap Check

Adjustment

Note 1: For the machines installed the fence on the entrance slant guide assembly, if the whole assembly of the movable guide or the entrance slant guide assembly has been moved, check that the clearance between upper drum and fence, referring to Fig. 10-27-2. For the adjustment, refer to section 3-8-1.

Note 2: For the machines installed type A exit slant guide assembly, if the whole assembly of the movable guide or the exit slant guide assembly has been moved, check that the clearance between upper drum and guide post, referring to Fig. 10-27-2.

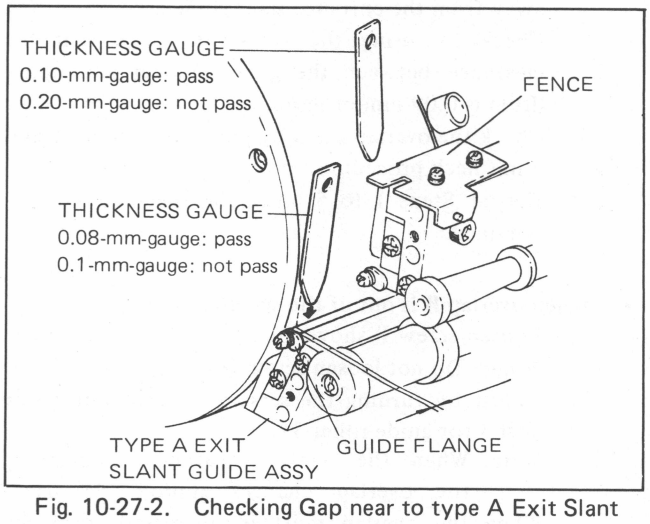
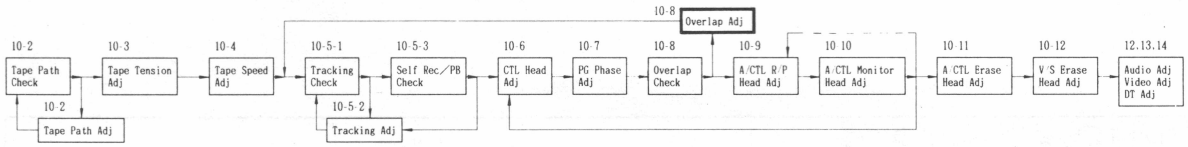


Fig. 10-27-2. Checking Gap near to type A Exit Slant Guide Assy

- When the sum of the overlaps B and C is the following value and either overlap is less than the specified value.
  For NTSC: 217 μsec or more
  For PAL : 287 μsec or more

1. When the overlap B is less than the specified value (see Fig. 10-26).
   a. Loosen four screws marked ☆.
   b. While pushing the movable guide assembly lightly to the head drum assembly, move it in the direction of the arrow CCW.
   c. Tighten four screws marked ☆ and check the overlap again.
   d. After performing the adjustment, turn the stopper clockwise, press it against the movable guide assembly and tighten the screw.

Note: When moving the movable guide assembly 1 mm along the circumference of the head drum, the overlap changes approx. 40 μsec.



2. When the overlap C is less than the specified value (see Fig. 10-26);
   a. Loosen the stopper, then loosen four screws marked ☆.
   b. While pushing the movable guide assembly against the head drum assembly, move it in the direction of the arrow CW.
   c. Tighten four screws marked ☆ and check the overlap again.
   d. After performing the adjustment, turn the stopper clockwise, press it against the movable guide assembly and tighten the screw.

- **When overlap C is out of the specified value;**
  1. Loosen screw N shown in Fig. 10-28 1/2 to 1 turn.
     Note: Do not loosen screw M.
  2. Adjust by turning the setscrew driven into the taper guide.
     Note: When the setscrew is turned 10 degrees, the overlap changes approx. 27 μsec.
     When the overlap must be increased, turn the setscrew clockwise.
     When the overlap must be decreased, turn the setscrew counterclockwise and then push the entrance slant guide assy against the tip of the setscrew by hand.
     Note: When pushing the entrance slant guide, do not use a screwdriver.
  3. Tighten screws N and M fixing the entrance slant guide assy.
  4. Turn the upper drum by hand and keep the head away from the entrance slant guide assy.
     Check by using the thickness gauge that the clearance between the guide bracket and upper drum is 0.09 mm or more.
  5. Check the overlap again by performing Steps 4 and 5 in Check procedure.
     Repeat Steps 1 to 5 untill the specified value is obtained.

- **When overlap B is out of the specified value;**
  1. Loosen screw P shown in Fig. 10-29 1/2 to 1 turn.
     Note: Do not loosen screw Q.
  2. Adjust by turning the setscrew driven into guide post 3 (or guide roller 3).
     Note: When the screw is turned 10 degrees, the overlap changes approx. 55 μsec.
     When the overlap must be increased, turn the setscrew clockwise.
     When the overlap must be decreased, turn the setscrew counterclockwise and then push the exit slant guide assy against the tip of the setscrew by hand.
     Note: When pushing the exit slant guide, do not use a screwdriver.
  3. Tighten screws P and Q fixing the exit slant guide assy.
  4. Turn the upper drum by hand and keep the head away from the exit slant guide assy.
     Check by using the thickness gauge that the clearance between the exit slant guide and upper drum is 0.25 mm or more.
  5. Check the overlap again by performing Steps 4 and 5 in Check procedure.
     Repeat Steps 1 to 5 until the specified value is obtained.

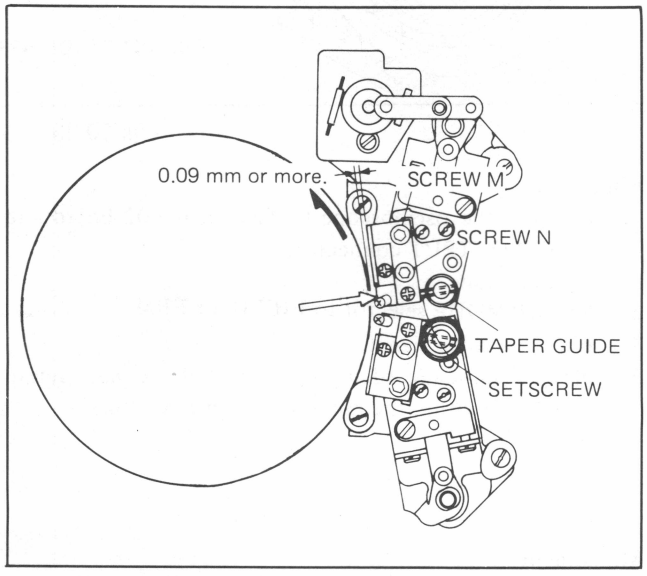


Fig. 10-28. Overlap C Adjustment

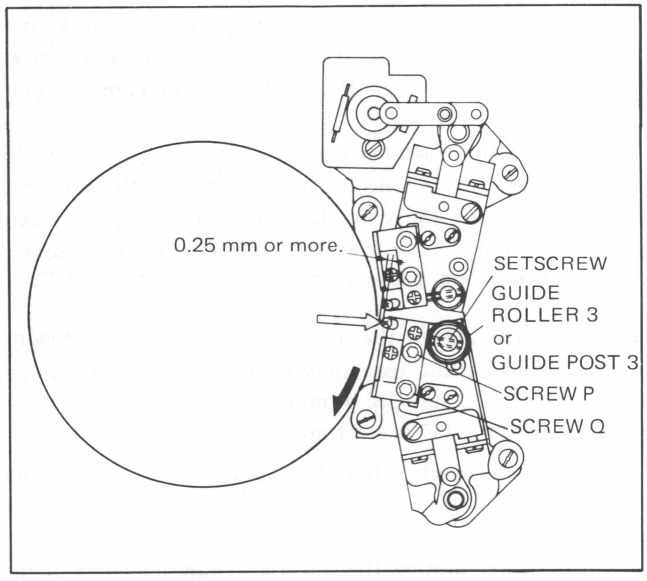
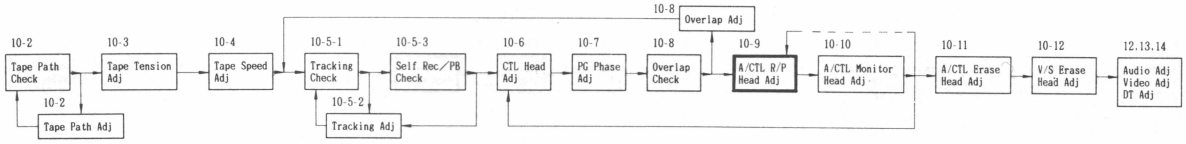


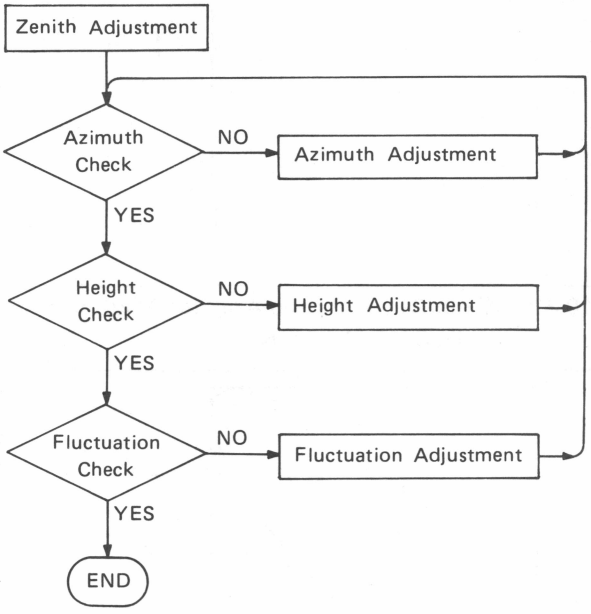
Fig. 10-29. Overlap B Adjustment

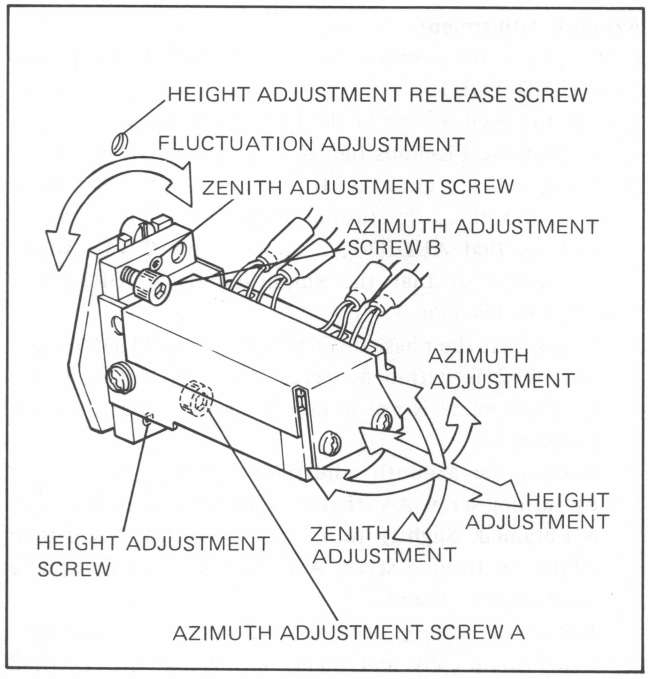


10-9. AUDIO/CTL R/P HEAD ADJUSTMENT

Preliminary Information

A. Perform the adjustment, following the flowchart below.





B. When the guides on the tape path have been adjusted, be sure to check the audio/CTL R/P head, following the above flowchart.

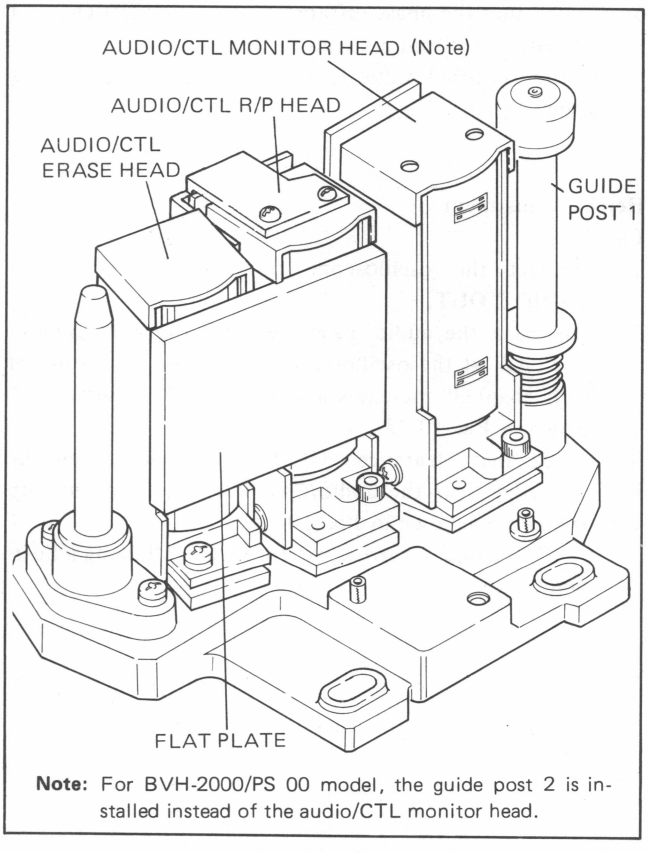
C. Prepare the following flat plate for zenith adjustment. Part No. J-6040-160-A

D. The zenith adjustment is not necessary except when the zenith adjustment screw has been made to turn or the azimuth adjustment screw has been tightened excessively.

E. When replacing the R/P head refer to Section 3-20 and when performing the adjustment after replacing the head, follow the flowchart shown in Section 3-24-1.

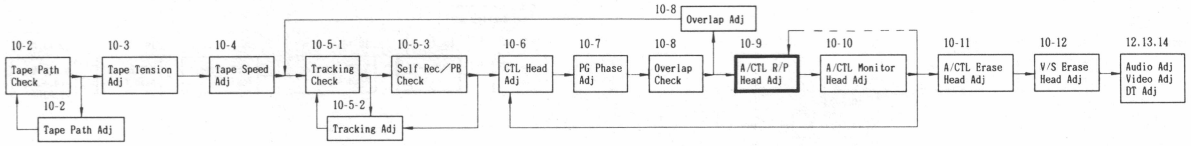
Zenith Adjustment

1. Put the flat plate on both audio/CTL erase head and audio/CTL R/P head as shown in Fig. 10-30.
   Check that there is no space between the audio/CTL R/P head and the flat plate when the plate is put on the audio/CTL erase head without any space and also check that there is no space between the audio/CTL R/P head and the flat plate when the plate is put on the audio/CTL monitor head (for BVH-2000/PS/PM 02/04 model or BVH-2500/P) or the guide post 2 (for BVH-2000/PS 00 model) without any space.
2. If there is a space, eliminate the space by turning the zenith adjustment screw.



Note: For BVH-2000/PS 00 model, the guide post 2 is installed instead of the audio/CTL monitor head.

Fig. 10-30. Audio/CTL R/P Head Zenith Adjustment



Azimuth Adjustment

1. Connect the oscilloscope to AUDIO-1 OUT and AUDIO-2 OUT.
   Set the oscilloscope in the EXT. HORIZONTAL mode so that the Lissajous figures can be seen on the scope.
2. Play back the audio 3 kHz segment of the alignment tape and adjust by turning AUDIO-1, 2 PB level controls so that AUDIO-1, 2 meters show 0 VU. Adjust the scope so that the amplitude of AUDIO-1 and AUDIO-2 is 6 cm.
3. Check that the phase difference between AUDIO-1 and AUDIO-2 is within 5 degrees. See Fig. 10-31. If the specified value is not obtained, perform the following adjustment.
4. Loosen the azimuth adjustment screw B and adjust by turning screw A so that the specified phase difference is obtained. Slightly turn screw B clockwise and then adjust by turning screw A so that the specified phase difference is obtained.
   Repeat the same procedure until both screws are tightened completely and finally check that the specified value is obtained.
   Note: The screws should be tightened with 6 to 8 kg•cm torque.
5. Play back the audio 15 kHz segment of the alignment tape and adjust the scope so that the amplitude of AUDIO-1 and AUDIO-2 is 6 cm.
6. Check that the phase difference between AUDIO-1 and AUDIO-2 is within 30 degrees. See Fig. 10-32.
   If the specified value is not obtained, repeat Step 4 again.

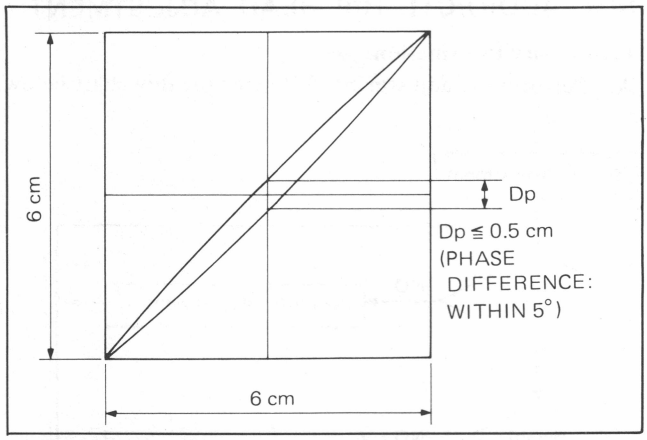


Fig. 10-31. Audio/CTL R/P Head Azimuth Adjustment of Audio 3 kHz Playback

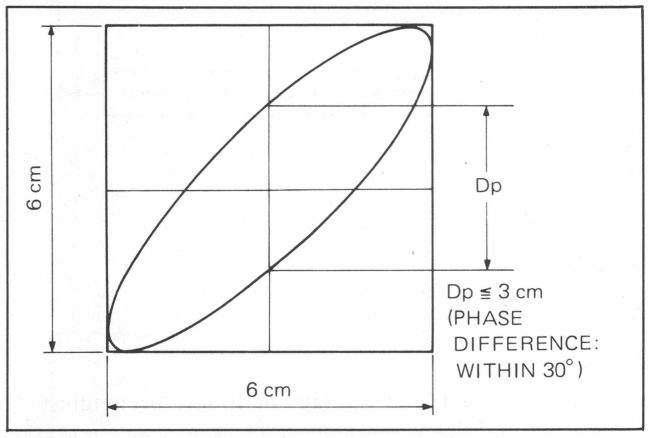


Fig. 10-32. Audio/CTL R/P Head Azimuth Adjustment of Audio 15 kHz Playback

Height Adjustment

Check

1. Connect the oscilloscope to AUDIO-1 OUT and AUDIO-2 OUT.
2. Play back the audio 3 kHz segment of the alignment tape. Adjust the oscilloscope so that the amplitude of both channels increases and it is equal. Observe "G" shown in Fig. 10-33.
3. Check that clearance "G" becomes wide when the tape edge near the audio/CTL R/P head is pushed up or down, as shown in Fig. 10-34.
   If "G" becomes narrow, perform the following adjustment.

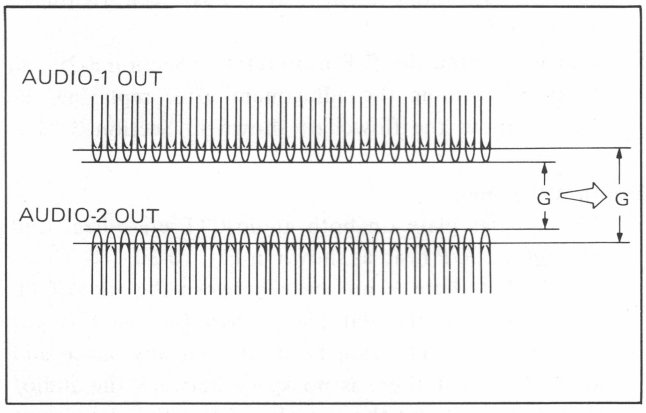
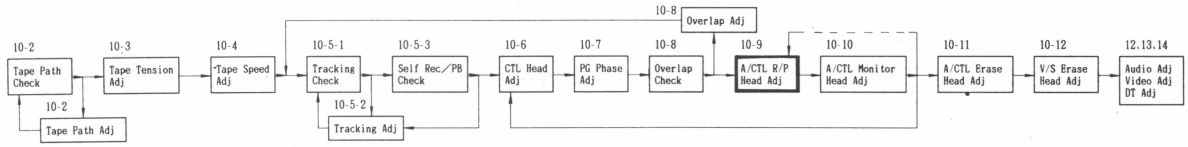


Fig. 10-33. Audio/CTL R/P Head Height Check



Adjustment

4. Loosen the height adjustment release screw 1/2 to 1 turn.
5. Turn the height adjustment screw as follows.
   a. If "G" becomes narrow when the tape is pushed down, turn the height adjustment screw clockwise.
   b. If "G" becomes narrow when the tape is pushed up, turn the height adjustment screw counterclockwise.
6. Tighten the height adjustment release screw and check the height again by performing Step 3.

   Note: The height adjustment release screw should be tightened with 14 to 16 kg-cm torque.

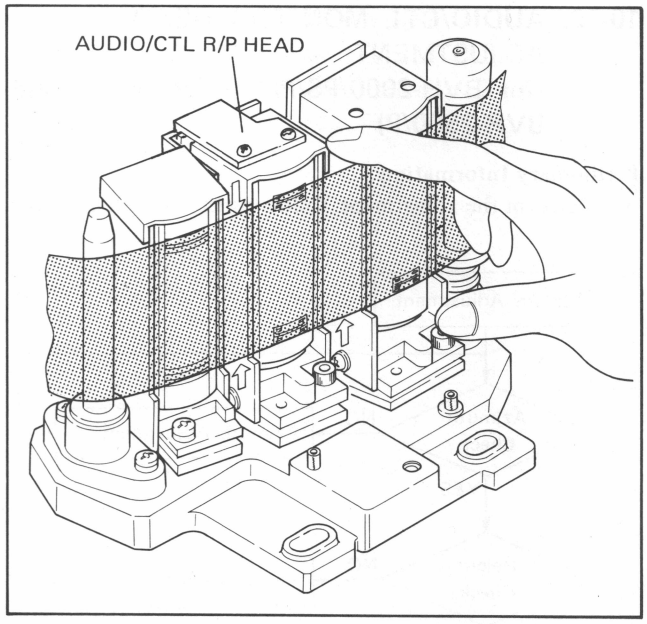


Fig. 10-34. Audio/CTL R/P Head Height Check

Fluctuation Adjustment

Check

1. Connect the oscilloscope to AUDIO-1 OUT.
2. Check that SKEW switch on RL-12 board is set to AUTO.
3. Play back the audio 15 kHz segment of the alignment tape, and adjust the scope so that the amplitude "A" becomes as wide as possible as shown in Fig. 10-35.
4. Set SKEW switch to MANU and turn SKEW knob full counterclockwise, and then suppose that the amplitude shown on the scope is "B".

   Check that the ratio of "A" to "B" is the specified value shown in Fig. 10-35. If the specified value is obtained, set SKEW switch to AUTO. If the specified value is not obtained, perform the following adjustment.

Adjustment

5. Check that the height adjustment screw is not being loose.
6. Loosen the height adjustment release screw 1/2 to 1 turn.
7. When the fluctuation adjustment screw is turned clockwise or counterclockwise a little and check whether the specified value shown in Fig. 10-35 is obtained. Repeat the adjustment and check procedures until the specified value is obtained.
8. Tighten the height adjustment release screw and check that the specified value is obtained by performing Step 4 again.

   Note: The height adjustment release screw should be tightened with 14 to 16 kg-cm torque.
9. Return to the beginning of the flowchart and check the azimuth and height.

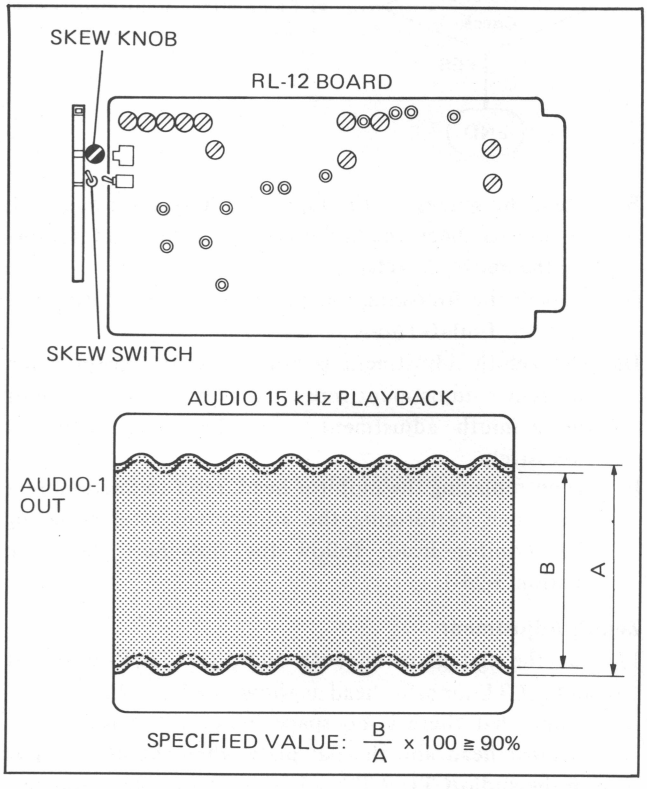
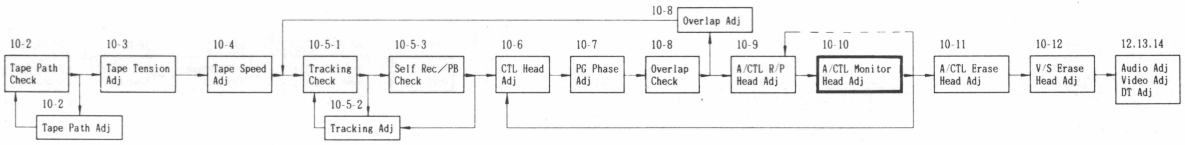


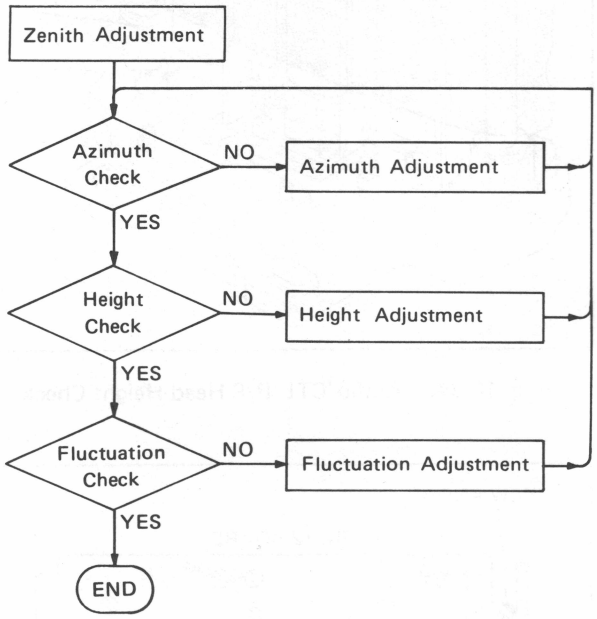
Fig. 10-35. Audio/CTL R/P Head Fluctuation Adjustment



10-10. AUDIO/CTL MONITOR HEAD ADJUSTMENT (for BVH-2000/PS/PM 02/04 model and BVH-2500/P)

Preliminary Information

A. Perform the adjustment, following the flow chart below.



B. When the guides on the tape path have been adjusted, be sure to check the audio/CTL monitor head, following the above flowchart.

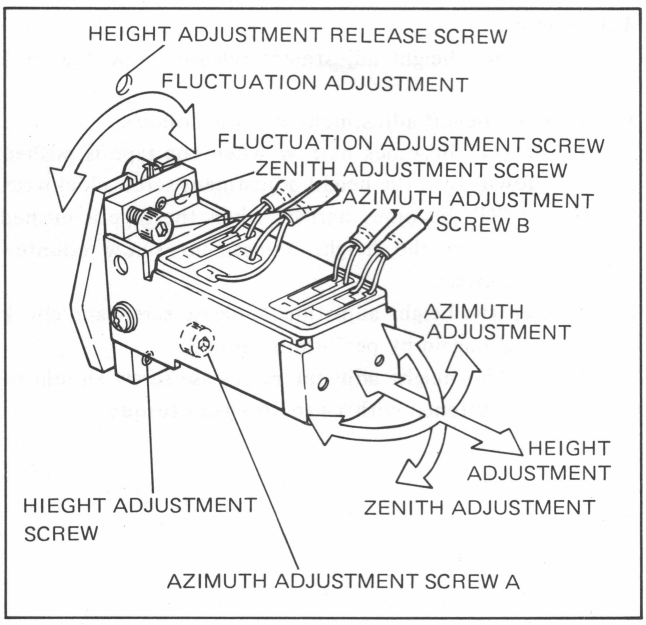
C. Prepare the following flat plate for zenith adjustment. Part No. J-6040-160-A

D. The zenith adjustment is not necessary except when the zenith adjustment screw has been made to turn or the azimuth adjustment screw has been tightened excessively.

E. When replacing the monitor head, refer to Section 3-21 and when performing the adjustment after replacing the monitor head, follow the flowchart shown in Section 3-24-1.

Zenith Adjustment

1. Put the flat plate on both audio/CTL R/P head and audio/CTL monitor head as shown in Fig. 10-36.
   Check that there is no space between the audio/CTL monitor head and the flat plate when the plate is put on the audio/CTL R/P head without any space and also check that there is no space between the audio/CTL monitor head and that plate when the plate is put on the guide post 1 without any space.
2. If there is a space, equalize and minimize each space by turning the zenith adjustment screw of the audio/CTL monitor head.



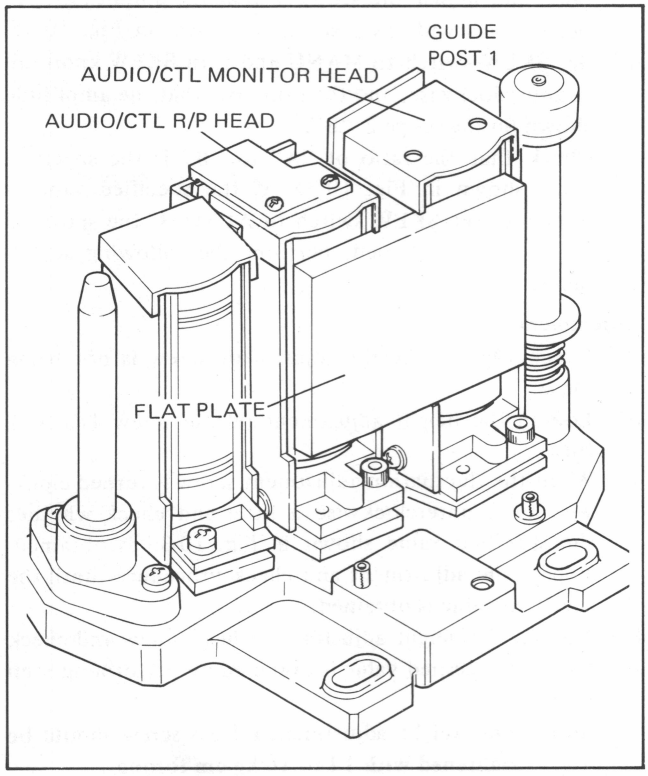
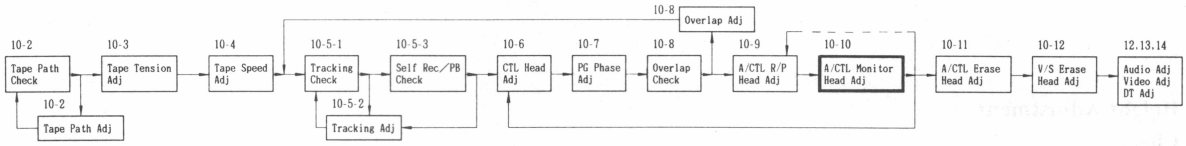


Fig. 10-36. Audio/CTL Monitor Head Zenith Adjustment



Azimuth Adjustment

1. Set AUDIO MONITOR select button to AUDIO-1 AUDIO-2, and short-circuit JP1 on LG board.
2. Connect the oscilloscope to MONITOR OUTPUT L and MONITOR OUTPUT R.
   Set the oscilloscope in the EXT. HORIZONTAL mode so that the Lissajous figures can be seen on the scope.
3. Play back the audio 3 kHz segment of the alignment tape and adjust by turning RV106 and RV206 on the AU-27 board so that AUDIO-1, 2 meters show 0 VU. Adjust the scope so that the amplitude of the audio-1 channel and the audio-2 channel is 6 cm.
4. Check that the phase difference between the audio-1 channel and the audio-2 channel is within 5 degrees. See Fig. 10-37.
   If the specified value is not obtained, perform the following adjustment.
5. Loosen the azimuth adjustment screw B and adjust by turning screw A so that the specified phase difference is obtained. Slightly turn screw B clockwise and then adjust by turning screw A so that the specified phase difference is obtained. Repeat the same procedure until both screws are tightened completely and finally check that the specified value is obtained.
   Note: The screws should be tightened with 6 to 8 kg·cm torque.
6. Play back the audio 15 kHz segment of the alignment tape and adjust the scope so that the amplitude of the audio-1 channel and the audio-2 channel is 6 cm.
7. Check that the phase difference between the audio-1 channel and the audio-2 channel is within 30 degrees. See Fig. 10-38.
   If the specified value is not obtained, repeat Step 5 again.

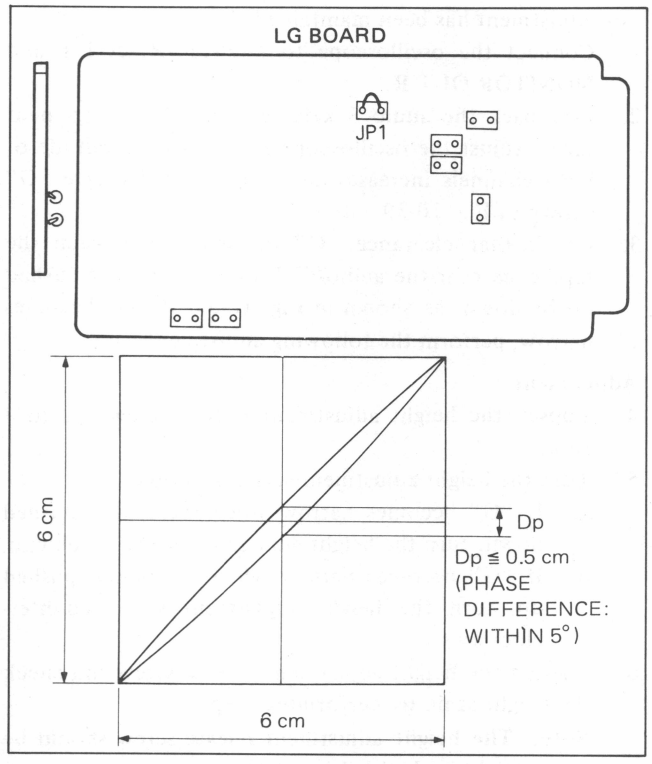


Fig. 10-37. Audio/CTL Monitor Head Azimuth Adjustment of Audio 3 kHz Playback

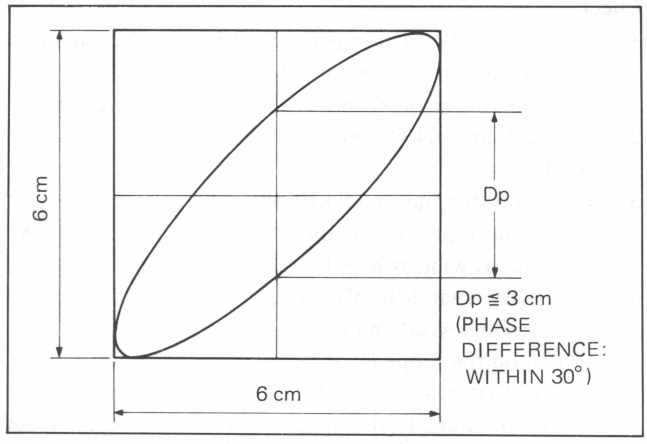


Fig. 10-38. Audio/CTL Monitor Head Azimuth Adjustment of Audio 15 kHz Playback

Height Adjustment

Check

1. Check that the setting performed in Step 1 of azimuth adjustment has been maintained.
   Connect the oscilloscope to MONITOR OUT L and MONITOR OUT R.
2. Play back the audio 3 kHz segment of the alignment tape. Adjust the oscilloscope so that the amplitude of both channels increases and it is equal. Observe "G" shown in Fig. 10-39.
3. Check that clearance "G" becomes wide when the tape edge near the audio/CTL monitor head is pushed up or down, as shown in Fig. 10-39. If "G" becomes narrow, perform the following adjustment.

Adjustment

4. Loosen the height adjustment release screw 1/2 to 1 turn.
5. Turn the height adjustment screw as follows.
   a. If "G" becomes narrow when the tape is pushed down, turn the height adjustment screw clockwise.
   b. If "G" becomes narrow when the tape is pushed up, turn the height adjustment screw counterclockwise.
6. Tighten the height adjustment release screw and check the height again by performing Step 3.
   Note: The height adjustment release screw should be tightened with 14 to 16 kg-cm torque.

Fluctuation Adjustment

Check

1. Check that the setting performed in step 1 of azimuth adjustment has been maintained.
   Connect the oscilloscope to MONITOR OUT L.
2. Check that SKEW switch on RL-12 board is set to AUTO.
3. Play back the audio 15 kHz segment of the alignment tape, and adjust the scope so that the amplitude "A" becomes as wide as possible. See Fig. 10-40.
4. Set SKEW switch to MANU and turn SKEW knob full counterclockwise, and then suppose that the amplitude shown on the scope is "B".
   Check that the ratio of "A" to "B" is within the specified value. If the specified value is obtained, set SKEW switch to AUTO. If the specified value is not obtained, perform the following adjustment.

Adjustment

5. Check that the height adjustment screw is not being loose.
6. Loosen the height adjustment release screw 1/2 to 1 turn.
7. Turn the fluctuation adjustment screw clockwise or counterclockwise a little and check that the specified value shown in Fig. 10-40 is obtained. Repeat the adjustment and check procedures until the specified value is obtained.
8. Tighten the height adjustment release screw and check that the specified value is obtained by performing Step 4 again.

   Note: The height adjustment release screw should be tightened with 14 to 16 kg-cm torque.
9. Return to the beginning of the flowchart and check the azimuth and height.
10. Remove the jumper connected in Step 1 of the azimuth adjustment.

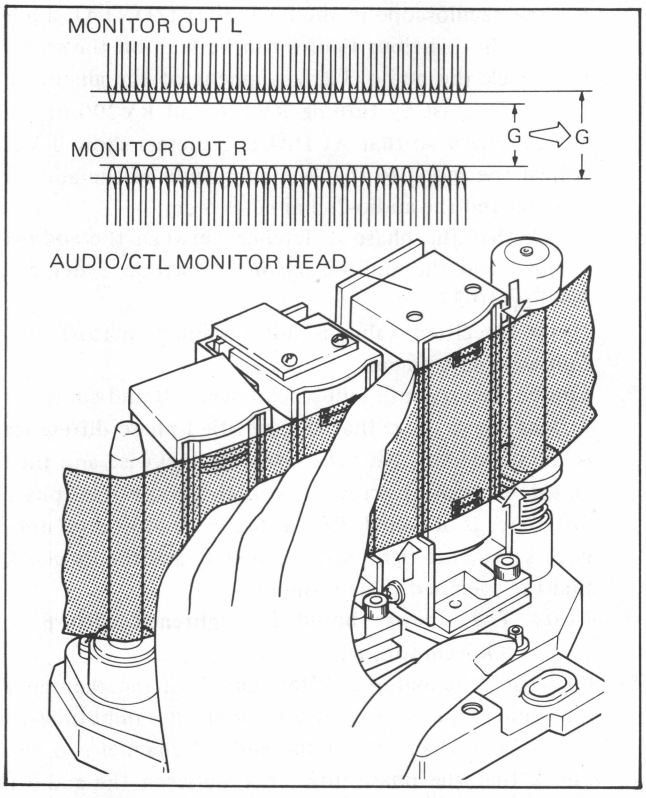


Fig. 10-39. Audio/CTL Monitor Head Height Check

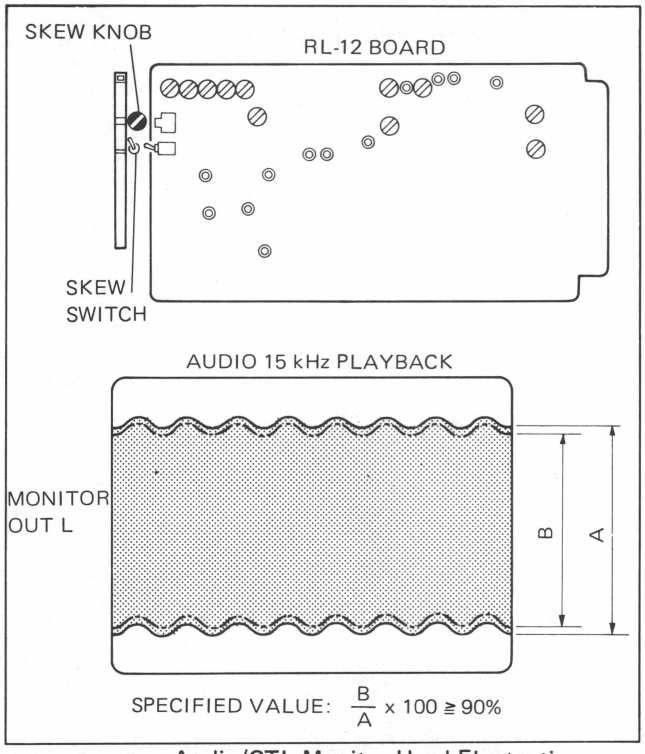


Fig. 10-40. Audio/CTL Monitor Head Fluctuation Adjustment

10-11. AUDIO/CTL ERASE HEAD HEIGHT ADJUSTMENT

Preliminary Information

A. When the height of the audio/CTL erase head has been changed or when the height of the guides has been adjusted by performing the tape path adjsutment, check the height of the audio/CTL erase head.

B. When replacing the audio/CTL erase head, refer to Section 3-22. When performing the adjustment after replacing the erase head, follow the flowchart shown in Section 3-24-1 and then perform the alignment in Section 12; Audio Signal System Alignment.

Check

1. Set AUDIO MONITOR select button to [AUDIO-1 / AUDIO-2].
2. Record 1 kHz signal on the audio-1 and audio-2 channels.
3. Rewind the segment recorded in Step 2 and record no signal on the audio-1 and audio-2 channels.
4. Connect the headphones and play back the segment of no signal recorded in Step 3.
   Check that 1 kHz signal is not heard even if MONITOR/PHONES level control is set to maximum. If the signal is heard, adjust as follows.

Adjustment

5. Loosen the adjustment release screw 1/2 to 1 turn.
6. Change the head height by turning the height adjustment screw a little. After tightening the adjustment release screw, check the height of the head by performing Steps 2 to 4 again.

   Note: The adjustment release screw should be tighten with 14 to 16 kg-cm torque.

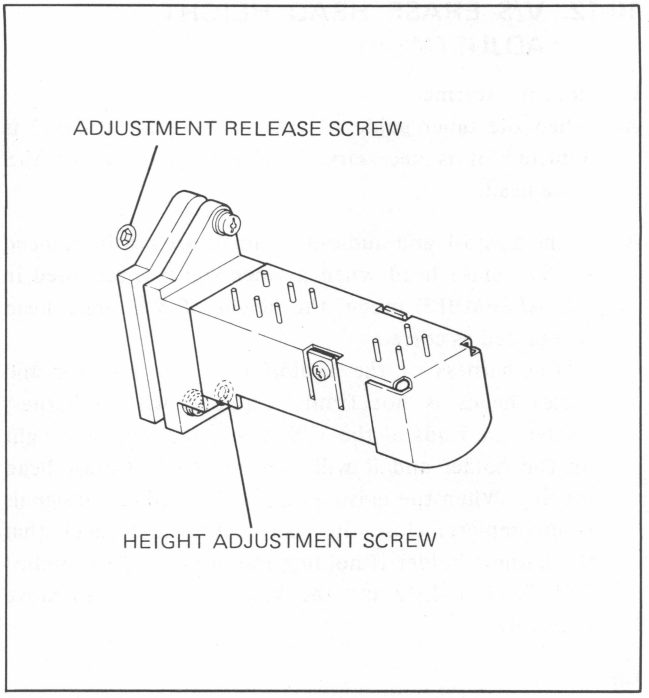
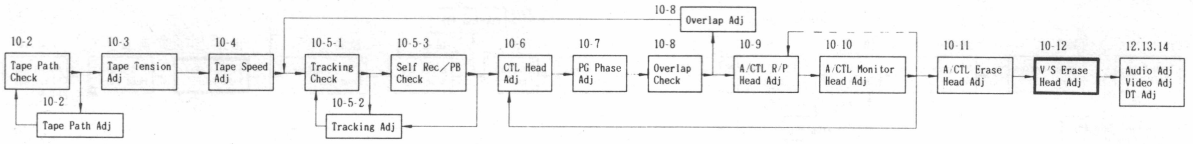


Fig. 10-41. Audio/CTL Erase Head Height Adjustment



10-12. V/S ERASE HEAD HEIGHT ADJUSTMENT

Preliminary Information

A. When the taper guide is replaced or guide roller 2 is adjusted, it is necessary to adjust the height of V/S erase head.

B. If the audio-1 and audio-3 channels are not influenced by V/S erase head when a video signal is recorded in the ASSEMBLE mode, the height of V/S erase head is regarded as correct.

C. If the harness of the audio/CTL (R/P, monitor and erase) heads is not firmly clamped with a harness holder, the leads of the V/S erase head may be caught on the holder and it will prevent the V/S erase head moving. When the erasure of the video and sync signals is incomplete, close the slant guides and check that the harness holder is holding the harness of the audio/CTL heads tightly and the V/S erase head can move smoothly.

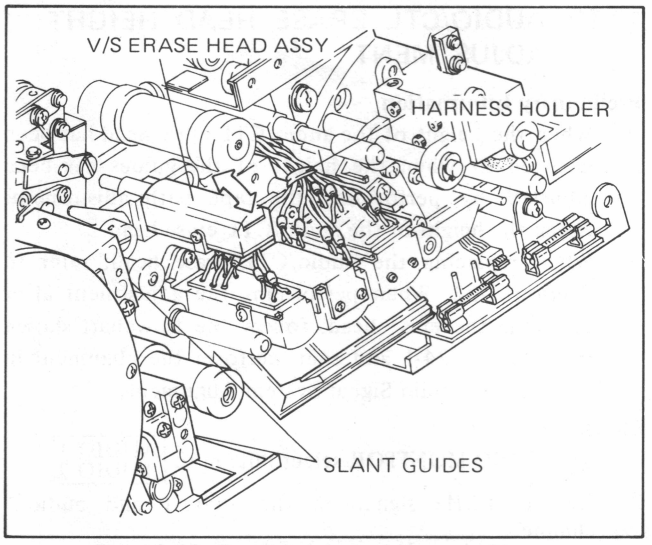


Fig. 10-42. Confirmation of Harness Clamp

Check

1. Record 3 kHz signal on the audio-1 and -3 channels.
2. Rewind half of the segment recorded in Step 1, and record a video signal on the video and sync channels in the ASSEMBLE mode.
3. Connect the oscilloscope to AUDIO-1 and AUDIO-3 LINE OUTPUTs.
4. Playing back the segment recorded in Steps 1 and 2, check that the waveform does not change at the IN point. If the waveform changes, perform the following adjustment.

Adjustment

5. Take off V/S erase head assy by removing V/S screw.
6. Change the thickness of the spacer.

   a. If the audio-1 waveform changes, decrease the thickness of the spacer.
   b. If the audio-3 waveform changes, increase the thickness of the spacer.

Thickness (mm)	Part No.
0.05	3-651-419-01
0.1	3-651-419-21

7. Mount V/S erase head assy referring to Fig. 10-43, and check the height of V/S erase head by performing Steps 1 to 4 again.

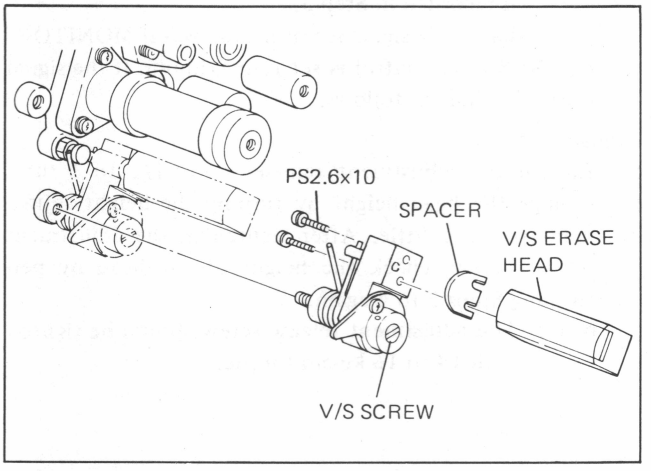
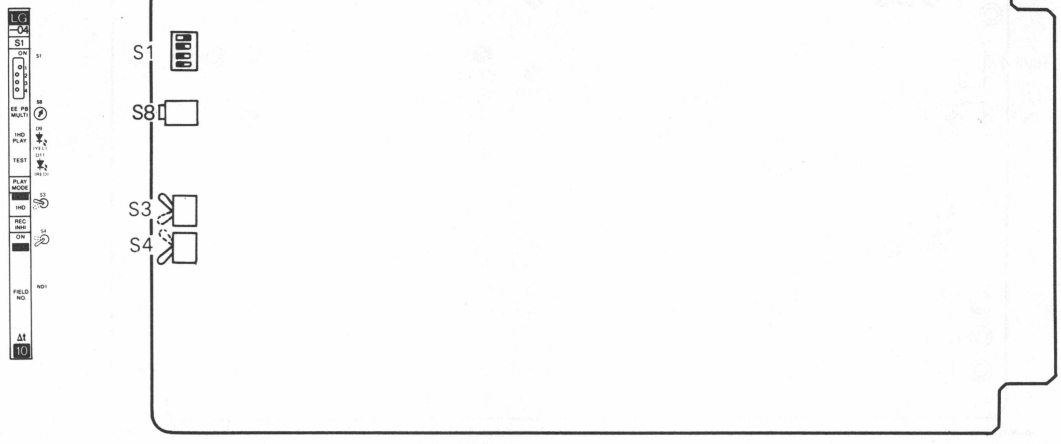


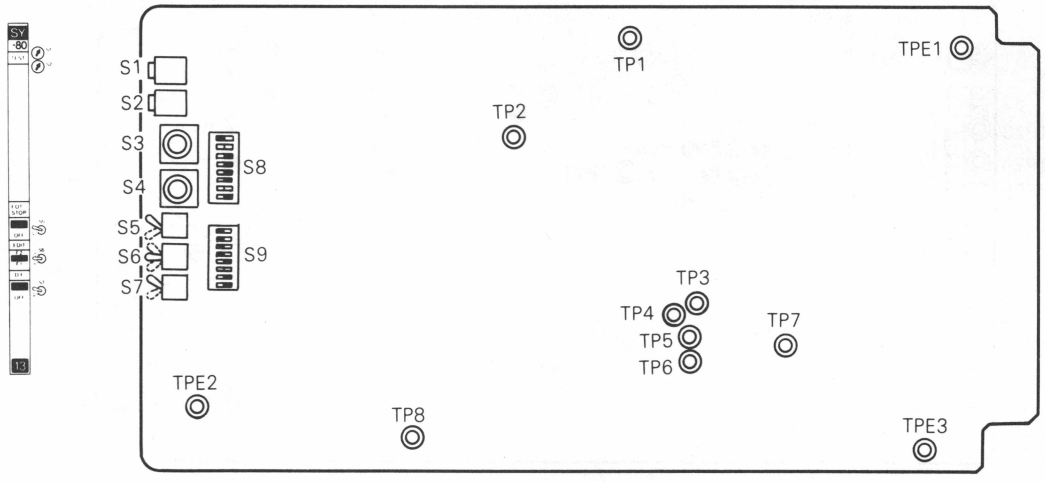
Fig. 10-43. V/S Erase Head Height Adjustment

SECTION 11
SERVO SYSTEM ALIGNMENT

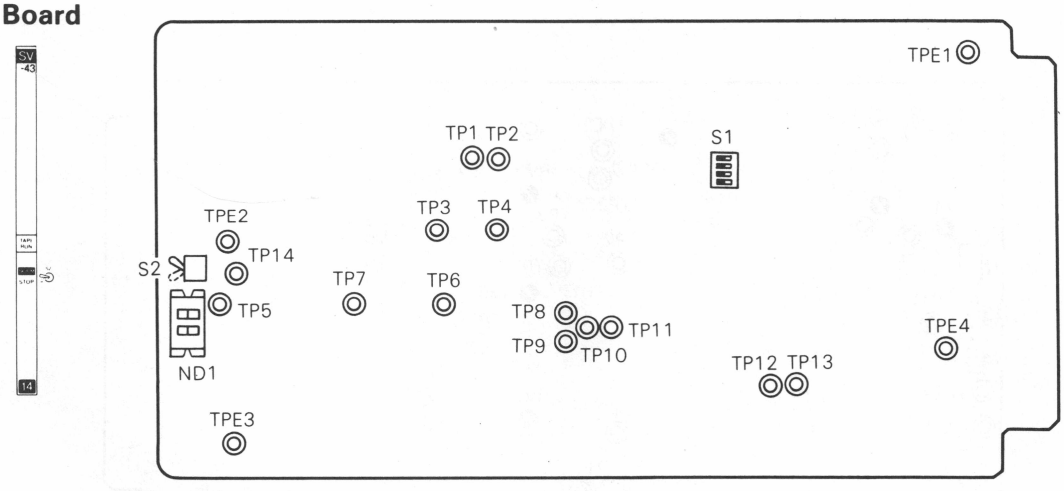
LG-04 Board



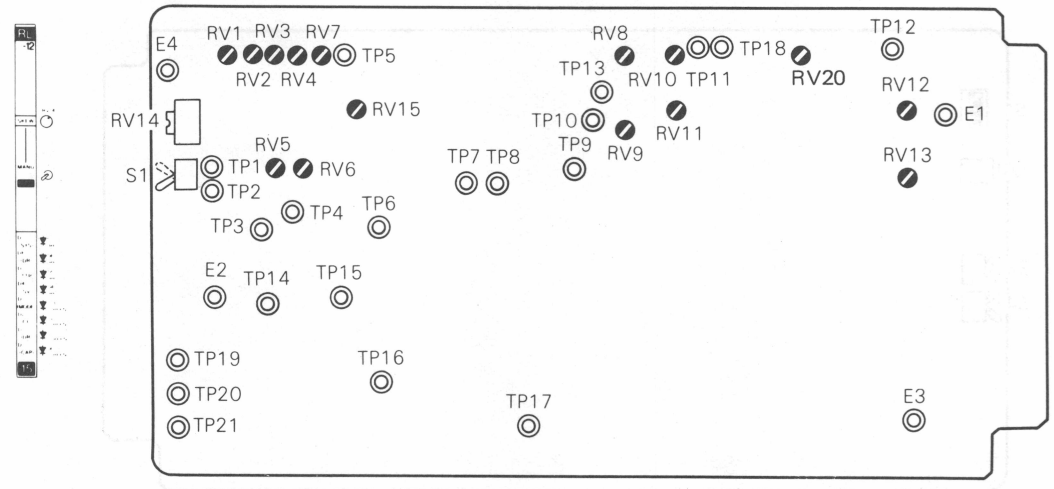
SY-80 Board



SV-43 Board

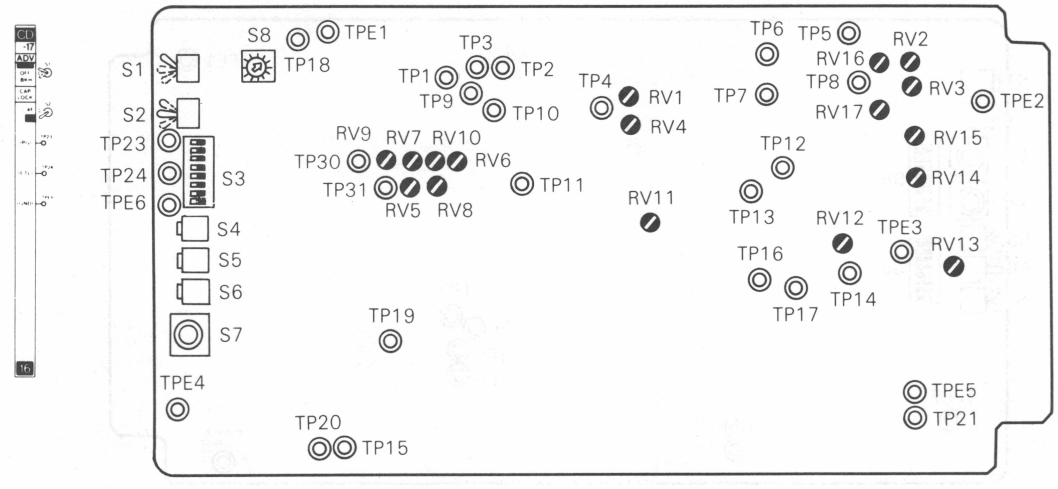


RL-12 Board

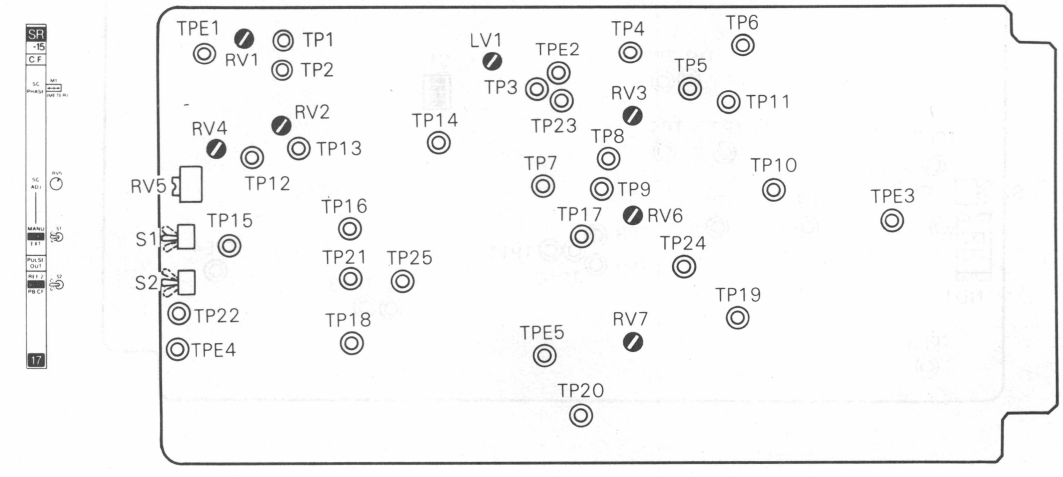


CD-17 Board

1-606-705-12 and up

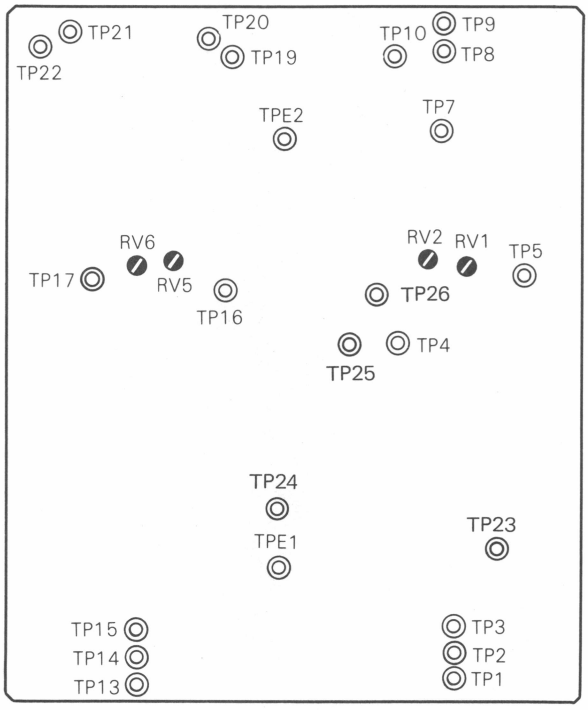


SR-15 Board



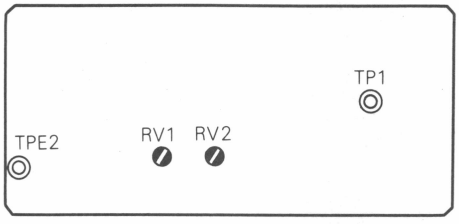
RA-05 Board

1-606-694-13 and up



TT-01 Board

1-606-697-12 and up



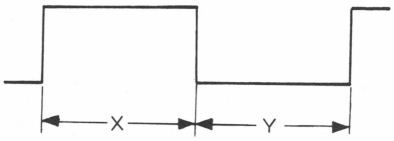
11-1. S/T-REEL AND TIMER ROLLER FG DUTY ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; Program Jog +3 Times Normal
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Set the TEST switch (S4/CD-17) to position "1"and press the ENTRY switch (S7/CD-17) more than 0.5sec.

Step 2. Adjustment

	RL-12 Board
T-REEL FG (A);	TP2 X = Y ⊘RV5
T-REEL FG (B);	TP1 X = Y ⊘RV6
S-REEL FG (A);	TP3 X = Y ⊘RV2
S-REEL FG (B);	TP14 X = Y ⊘RV4
TIMER ROLLER(A);	TP15 X = Y ⊘RV1
TIMER ROLLER(B);	TP6 X = Y ⊘RV3



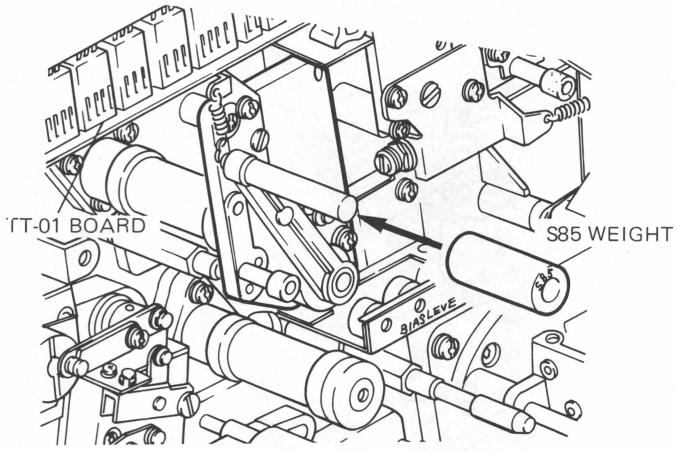
Step 3.
After adjustment, place the machine into the STOP mode.
Set the TEST-1 switch (S4/CD-17) to position "0" and press the ENTRY switch (S7/CD-17) more than 0.5sec.

11-2. S-TENSION SENSOR ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Prepare the Tension Adjustment Tool.
SONY Part No. J-6043-120-A

Step 2.
Put the S85 weight on the guide shaft of the S-tension arm.
Hold up the S-tension arm by hand and release the hand gently.



Step 3. Adjustment RL-12 Board
TP12 = 0 ± 30mVdc
⊘RV12

Step 4.
Remove the S85 weight.

Step 5. Adjustment
TP12*/RL-12 = −2.6 ± 0.15Vdc
⊘RV1/TT-01

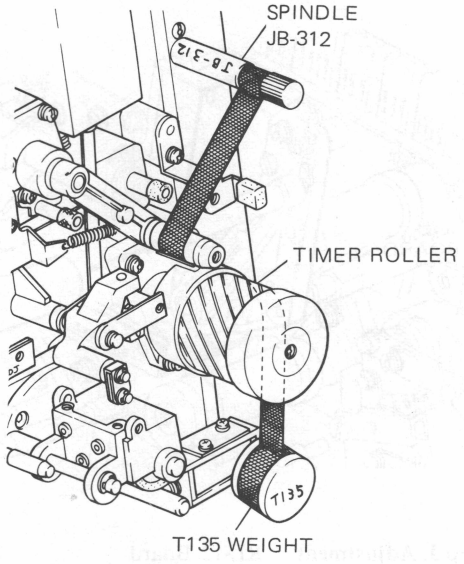
Note: TP12/RL-12
When adjust the RL-12 board with board No. 1-606-704-11, use at TP-IN terminal of the TF-01 board on the RL-12 board instead of TP12.

11-3. T-TENSION SENSOR ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Prepare the Tension Adjustment Tool.
SONY Part No. J-6043-120-A

Step 2.
Fix the JB-312 tension adjustment spindle, and put the T135 weight on the guide shaft of the T-tension arm as shown below.



Step 3. Adjustment RL-12 Board
TP13 = 0 ± 30 mVdc
◐RV13

Step 4.
Change the weight from T135 to T240.

Step 5. Adjustment
TP13/RL-12 = 1.4 ± 0.15 Vdc
◐RV2/TT-01 Board

Step 6.
After the adjustment, remove the tool.

11-4. A/D CONV. REFERENCE ADJSUTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Adjustment RL-12 Board
TP10 = 2.000 ± 0.001 Vdc
◐RV8

11-5. A/D CONVERTER ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

CAUTION:
Don't attempt to turn ⊘RV9 on the RL-12 board. In case of turning, set it as shown below.

RV9/RL-12

Step 1.
Remove solder at pin-43B of the edge connector on the extender, and connect a jumper between pin-43B of edge connector and GND.

Step 2.
Connect a jumper between TP18 and GND on the RL-12 board.

Step 3. Adjustment RL-12 Board
TP11 = 2.560 ± 0.005 Vdc
⊘RV11

Step 4.
Remove the jumper from extender and solder at pin-43B.

Step 5.
Set the TEST-1 switch (S4/CD-17) to position "E" and TEST-2 switch (S5/CD-17) to position "4*".

* When the following EPROMs are mounted on the SV-43 board, set the TEST-2 switch (S5/CD-17) to position "C".
IC1E MBM2732-S1U1
IC1F MBM2732-S2U1
IC1H MBM2732-S3U1
IC1I MBM2732-S4U1
IC6I MBM2732-S7U1
IC6K MBM2732-S8U1

Step 6.
Press the ENTRY switch (S7/CD-17) more than 0.5 sec.

Step 7. Adjustment
7-Seg. LEDs/SV-43 = Transition from "7F" to "80"
⊘RV10/RL-12

Step 8.
After adjustment, set TEST-1/2 switches to position "0" respectively.

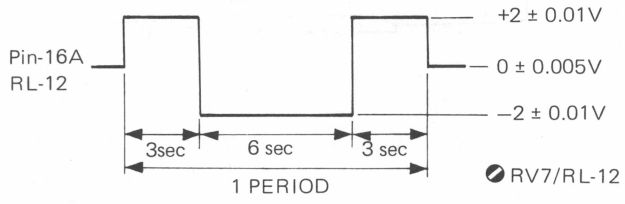
11-6. D/A CONVERTER ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
9" Full Wound Tape
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Put a 9" full wound tape, whose end is stuck by an adhesive tape, on the S-reel table.
Do not thread the tape.

Step 2. Adjustment RL-12 Board
Edge connector pin-16A = 0 ± 0.005 Vdc
⊘RV15

Step 3.
Set the TEST-1 switch (S4/CD-17) to position "2", press the ENTRY switch (S7/CD-17) and confirm the level changes at pin-16A/RL-12 as shown below.
If the top and bottom levels are not satisfied the specifications, adjust ⊘RV7/RL-12.



Step 4.
After adjustment, repeat step 2 and make sure step 3.

Step 5.
Set the TEST-1 switch (S4/CD-17) to position "0" and press the RESET switch (S3/SY-80).

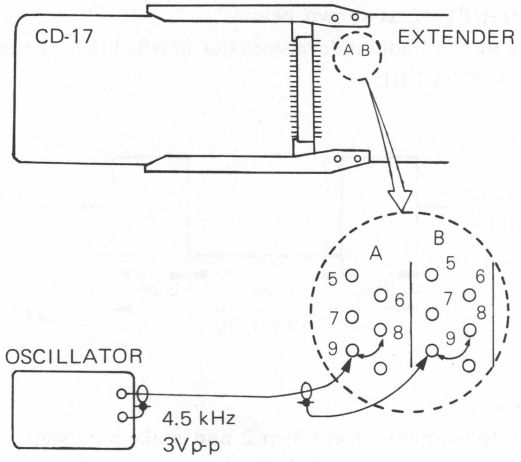
11-7. DRUM FG AMPLIFIER ADJUSTMENT

For CD-17 Board No. 1-606-705-12 & up

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Audio Oscillator
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Disconnect a 8-pin connector CN292 from the Drum Motor Assy.

Step 2.
Feed 4.5 kHz/3 Vp-p sine-wave signal at pin-8 and pin-9 on the CD-17 board through the Extender as shown below.



Step 3. Adjustment CD-17 Board
PHASE DIFFERENCE = less than 0.3 μsec
BETWEEN TP12 & TP13 ⊘RV14/⊘RV15

Step 4.
Connect CN292 to the Drum Motor Assembly.

11-8. DRUM VELOCITY ADJUSTMENT

Connection; See section 8-4 connection 4.
Mode of VTR; STANDBY ON
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Set the TEST-1 switch (S4/CD-17)to position "D" and press the ENTRY switch (S7/CD-17) more than 0.5 sec.

Step 2.
Place the machine into the STANDBY ON mode.

Step 3. Adjustment
7-Seg. LEDs/SV-43 = "FD", "FE", "FF", "00", "01" or "02"
⊘RV4/CD-17

Step 4.
After adjustment set TEST-1 switch (S4/CD-17) to position "0".

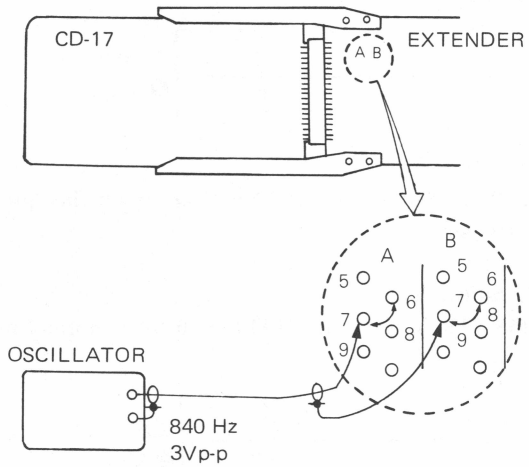
11-9. CAPSTAN FG AMPLIFIER ADJUSTMENT

For CD-17 Board No. 1-606-705-12 & up

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Audio Oscillator
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Disconnect a 10-pin connector CN106 from the Capstan Motor Assy.

Step 2.
Feed 840 Hz/3 Vp-p sine-wave signal at pin-6 and pin-7 on the CD-17 board through the Extender as shown below.



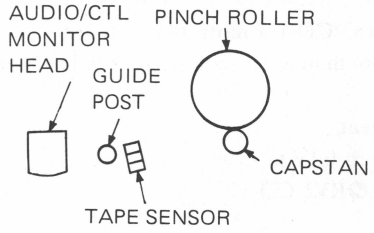
Step 3. Adjustment CD-17 Board
PHASE DIFFERENCE = less than 1.5 μsec
BETWEEN TP6 & TP7 ◐RV16/◐RV17

Step 4.
Connect CN106 to the Capstan Motor Assy.

11-10. CAPSTAN FG DUTY ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; Program Jog +10/30 Times Normal (NTSC)
Program Jog +8/25 Times Normal (PS/PM)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

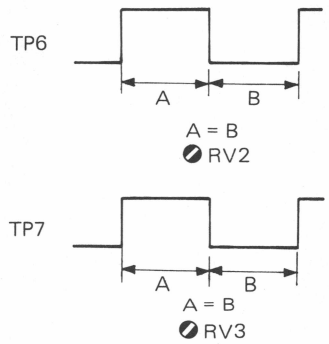
Step 1.
Remove the S and T reels.
Place a piece of paper in the tape sensor.



Step 2.
Set the TEST-1 switch (S4/CD-17) to position "1" and press the ENTRY switch (S7/CD-17) more than 0.5 sec.

Step 3.
Place the machine into Program Jog +10/30(+8/25 for PS/PM) times normal mode.

Step 4. Adjustment CD-17 Board



Step 5.
After adjustment, remove a piece of paper from the tape sensor, set the TEST-1 switch (S4/CD-17) to position "0" and press the ENTRY switch (S7/CD-17) more than 0.5 sec.

11-11. CAPSTAN VELOCITY ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; PLAY (use Alignment Tape)
Setting of Switches & Controls;
SERVO REF Sw :INPUT
REC INHIBIT Sw: ON
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Play back the 100% WHITE portion of alignment tape.

Step 2.
Set the TEST-1 switch (S4/CD-17) to position "B" and press the ENTRY switch (S7/CD-17) more than 0.5 sec.
After passing more than 5 sec, perform RV1 (CD-17) adjustment.

Step 3. Adjustment
TP1/CD-17 = 0 ± 0.1Vdc
◓RV1/CD-17

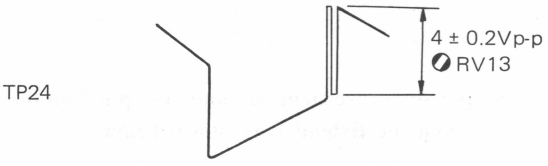
Step 4.
Set the TEST-1 switch (S4/CD-17) to position "0" and press the ENTRY switch (S7/CD-17) more than 0.5 sec.
After passing more than 5 sec, check that the voltage at TP1 (CD-17) for 0 ± 0.2 Vdc. If not, repeat from step 2.

11-12. PB CTL LEVEL ADJUSTMENT

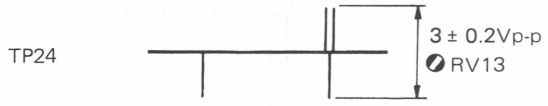
Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
SERVO REF Sw: INPUT
REC INHIBIT Sw: ON
Input Signal (VIDEO IN);
COLOR BARS

CD-17 Board
Step 1. Adjustment
Play back the 100% WHITE portion of the alignment tape.

For NTSC/PAL-M

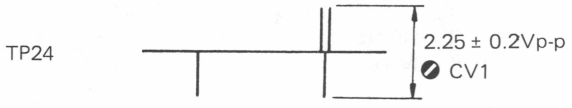


For PAL/SECAM

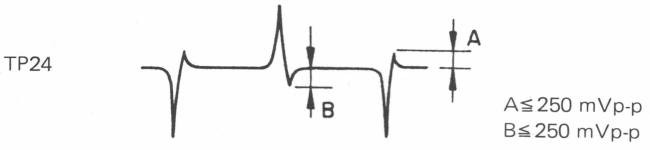


For the BVH-2000PS with serial No. 22401 and higher, proceed to the next steps.

Step 2. Adjustment
Place the VTR into the SHUTTLE −50 times normal mode.



Step 3. Check
After adjustment, place the VTR into the SHUTTLE −16 times normal mode.

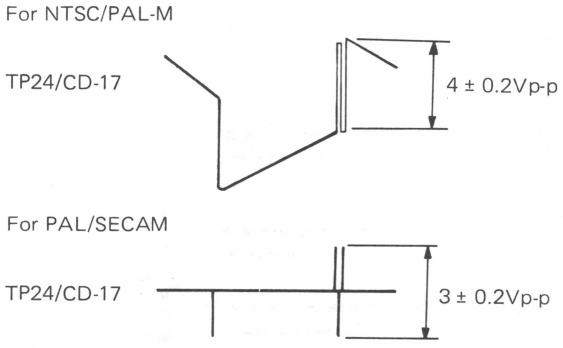


If the leveles are out of the specifications, return to the step 2 and readjust ◓CV1, and perform the step 3 again.

11-13. REC CTL LEVEL ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; REC
Setting of Switches & Controls;
SERVO REF Sw: INPUT
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Place the machine into the REC mode and play it back.

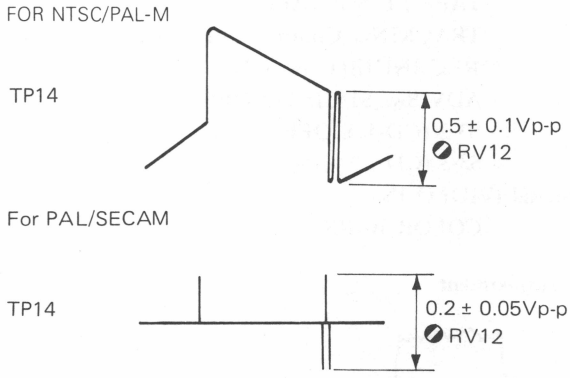


Step 2.
If it is out of specifications, place the machine into the REC mode and adjust ◐ RV11/CD-17 while recording.
Play back a recorded portion and repeat the adjustment until satisfy the specifications as shown in step 1.

11-14. CONFI CTL LEVEL ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; REC
Setting of Switches & Controls;
TAPE/EE Sel: TAPE
REC INHIBIT Sw: OFF
Input Signal (VIDEO IN);
COLOR BARS

Adjustment CD-17 Board

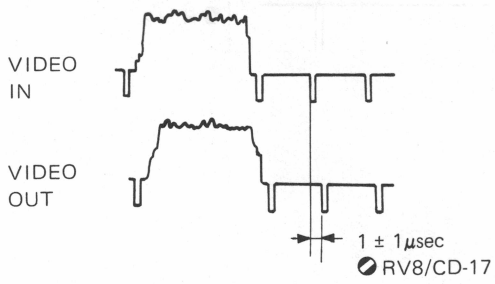


11-15. DRUM PG PHASE ADJUSTMENT

11-15-1. R/P Head

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; PLAY (use Alignment Tape)
Setting of Switches & Controls;
HEAD Sel: R/P (For BVH-2000/PS/PM)
R/P MODE Sel: FRM or FIELD
(For BVH-2500/P)
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
TRACKING Control: OFF (push)
REC INHIBIT Sw: ON
ADV Sw (S1/CD-17): OFF
S3-2 (CD-17): OFF
S3-3 (CD-17): ON
Input Signal (VIDEO IN);
COLOR BARS

Step 1. Adjustment



If the adjustment can not be made within the variable range of RV8, proceed to next step.

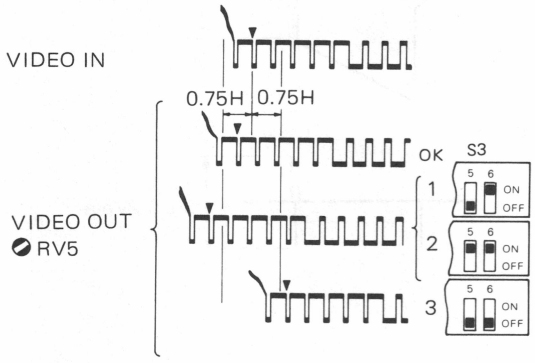
Step 2.
Set RV8/CD-17 to mid-way of the variable range and perform the following adjustment.

Step 3. Adjustment CD-17 Board

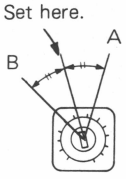
PHASE DIFFERENCE BETWEEN VIDEO IN & OUT = 0 ± 0.75H RV5

If not, set S3-5 and S3-6 as follows, and adjust RV5 again.

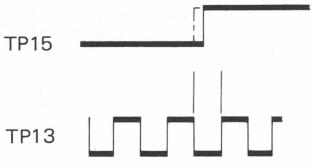
	S3-5	S3-6
1. OUT is in advance of IN. →	OFF	ON
2. If 1 is not effected. →	ON	ON
3. IN is in advance of OUT. →	OFF	OFF



Step 4.
Turn RV5 to CW/CCW and memorize the positions A and B of the RV5 when the VIDEO OUT phase to be shifted. Set RV5 to mid-way of the both positions.



Step 5. Adjustment CD-17 Board



Match the positive going edge at TP15 to the nearest positive or negative going edge at TP13 by RV5.

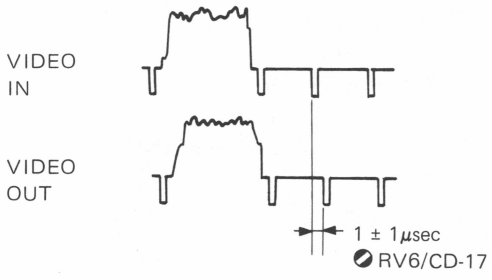
Step 6. Adjustment
Adjust RV8/CD-17 to obtain the phase difference at the VIDEO IN and VIDEO OUT for 1 ± 1 μsec.

11-15-2. PLAY Head

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; PLAY (use Alignment Tape)
Setting of Switches & Controls;
HEAD Sel: PLAY (For BVH-2000/PS/PM)
R/P MODE Sel: CONFI HEAD
(For BVH-2500/P)
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
REC INHIBIT Sw: ON
ADV Sw (S1/CD-17): OFF
S3-2 (CD-17): OFF →ON
S3-3 (CD-17): ON
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Set S3-2 (CD-17) to "OFF" and S3-3 (CD-17) to "ON".

Step 2. Adjustment



Step 3.
Reset S3-2 (CD-17) to "ON" and ADV switch (S1/CD-17) to "BVT" or "BKH" position.

11-16. TAPE SPEED ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Frequency Counter
Mode of VTR; REC
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
REC INHIBIT Sw: OFF
Input Signal (VIDEO IN);
COLOR BARS

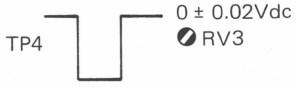
Adjustment CD-17 Board

TP6 = 839.4 ± 0.3Hz (NTSC/PAL-M)
825.0 ± 0.3Hz (PAL/SECAM)
RV9

11-17. PEDESTAL CLAMP ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

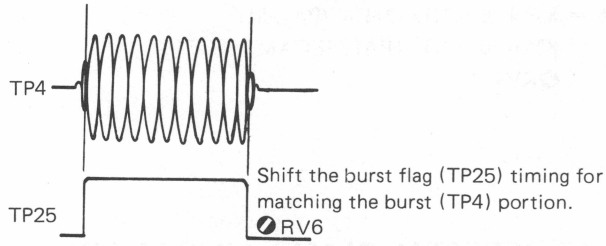
Adjustment SR-15 Board



11-18. BURST GATE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

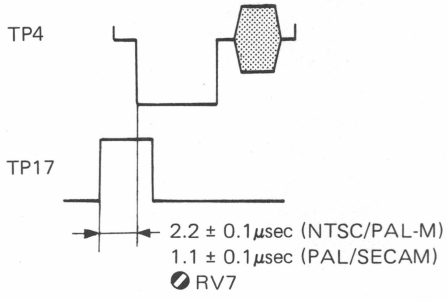
Adjustment SR-15 Board



11-19. H GATE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

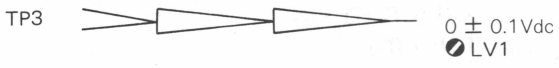
Adjustment SR-15 Board



11-20. PHASE-LOCKED-LOOP ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

Adjustment SR-15 Board



11-21. SC PHASE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
SC Sw (S1/SR-15): FIX →MANU
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Set the SC switch (S1/SR-15) to "FIX" position.

Step 2. Adjustment SR-15 Board
TP1 = −1.55 ± 0.02 Vdc (NTSC/PAL-M)
−1.10 ± 0.02 Vdc (PAL/SECAM)
RV4

TP2 = 0 ± 0.1 Vdc (NTSC/PAL-M/PAL/SECAM)
RV2

Step 3.
Set the SC switch (S1/SR-15) to "MANU" position.

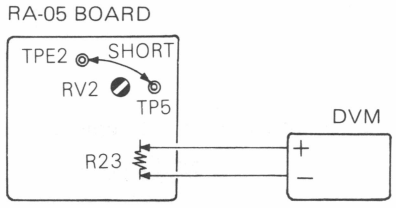
Step 4. Adjustment SR-15 Board
TP1 = −1.95 ± 0.02 Vdc (NTSC/PAL-M)
−1.50 ± 0.02 Vdc (PAL/SECAM)
RV5

TP2 = 2.0 ± 0.1Vdc (NTSC/PAL-M/PAL/SECAM)
RV1

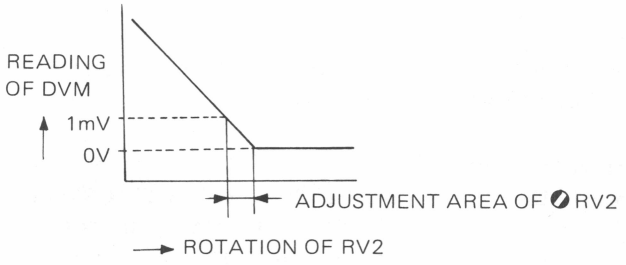
11-22. S-REEL AMPLIFIER OFFSET ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Connect a jumper between TP5 and GND and connect a digital voltmeter to R23 on the RA-05 board.



Step 2. Adjustment RA-05 Board

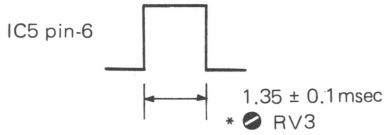


Step 3.
Remove the jumper.

11-23. S-REEL NORMAL TORQUE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; Program Jog ×1 FWD (use Alignment Tape)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
REC INHIBIT Sw: ON
Input Signal (VIDEO IN);
COLOR BARS

Adjustment RA-05 Board



* RV3 is not used on the board No. 1-606-694-13 & up.

11-24. S-REEL MOTOR TORQUE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
9" Full Wound Tape
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Load the 9" full wound tape, whose end is stuck by an adhesive tape, on the S-reel table.
Do not thread the tape.

Step 2.
Set the TEST-1 switch (S4/CD-17) to position "2".

Step 3.
Keep on pressing the ENTRY switch (S7/CD-17) until the S-reel starts rotation.

Step 4.
After passing about 12 sec the S-reel stops its rotation and the 7-Seg. LEDs/SV-43 display the data.

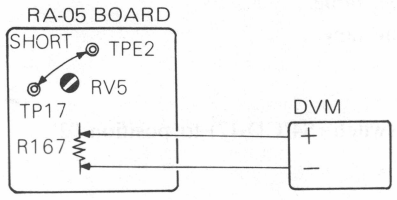
Step 5. Adjustment
7-Seg. LEDs/SV-43 = "C0", "C1", "C2", "C3", "C4", "C5", "C6", "C7", "C8", "C9", "CA", "CB", "CC", "CD", "CE" or "CF"
RV1/RA-05

Step 6.
After adjustment remove the 9" full wound tape.
Set the TEST-1 switch (S4/CD-17) to position "0" and press the RESET switch (S3/SY-80).

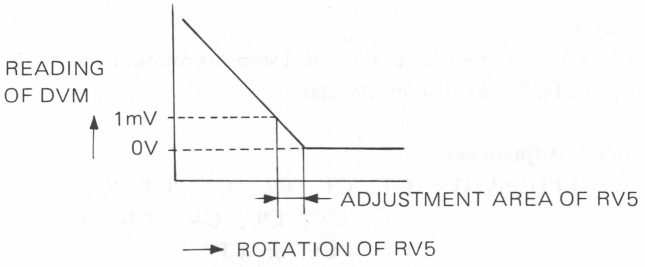
11-25. T-REEL AMPLIFIER OFFSET ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STOP (Auto EE)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Connect a jumper between TP17 and GND and connect a digital voltmeter to R167 on the RA-05 board.



Step 2. Adjustment RA-05 Board

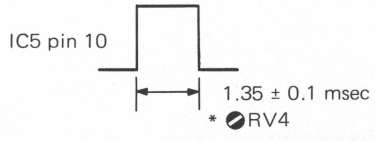


Step 3.
Remove the jumper.

11-26. T-REEL NORMAL TORQUE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Mode of VTR; Program Jog ×1 FWD (use Alignment Tape)
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
REC INHIBIT Sw: ON
Input Signal (VIDEO IN);
COLOR BARS

Adjustment RA-05 Board



* RV4 is not used on the board No. 1-606-694-13 & up.

11-27. T-REEL MOTOR TORQUE ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
9" Full Wound Tape
Mode of VTR; STOP
Setting of Switches & Controls;
SERVO REF Sw: INPUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Load the 9" full wound tape, whose end is stuck by an adhesive tape, on the T-reel table.
Do not thread the tape.

Step 2.
Set the TEST-1 switch (S4/CD-17) to position "3".

Step 3.
Keep on pressing the ENTRY switch (S7/CD-17) until the T-reel starts rotation.

Step 4.
After passing about 12sec the T-reel stops its rotation and the 7-Seg. LEDs/SV-43 display the data.

Step 5. Adjustment
7-Seg. LEDs/SV-43 = "C0", "C1", "C2", "C3", "C4", "C5", "C6", "C7", "C8", "C9", "CA", "CB", "CC", "CD", "CE" or "CF"
RV6/RA-05

Step 6.
After adjustment remove the 9" full wound tape.
Set the TEST-1 switch (S4/CD-17) to position "0" and press the RESET switch (S3/SY-80).

11-28. S-REEL TENSION OFFSET ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Digital Voltmeter
Mode of VTR; STANDBY ON
Input Signal (VIDEO IN);
Don't care.

Applicable Serial No.

BVH-2000: # 22501 & up
BVH-2000PS: # 12201 & up
BVH-2000PM: # 20201 & up
BVH-2500: # 10101 & up
BVH-2500P: # 10001 & up

Adjustment RL-12 Board

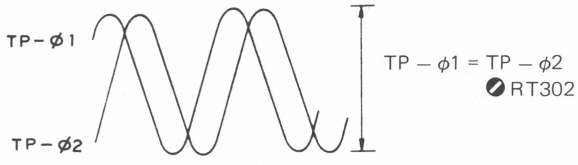
TP7 = 0 ± 50 mV
◐ RV20

11-29. IP MOTOR ADJUSTMENT

Connection; See section 8-4 connection 4.
Equipment; Oscilloscope
Frequency Counter (via Oscilloscope)
Mode of VTR; SHUTTLE +1/2
Input Signal (VIDEO IN);
Don't care.

Step. 1
Open the rear panel, remove the IP Driving Moter Assy from VTR, but don't remove the CN024.

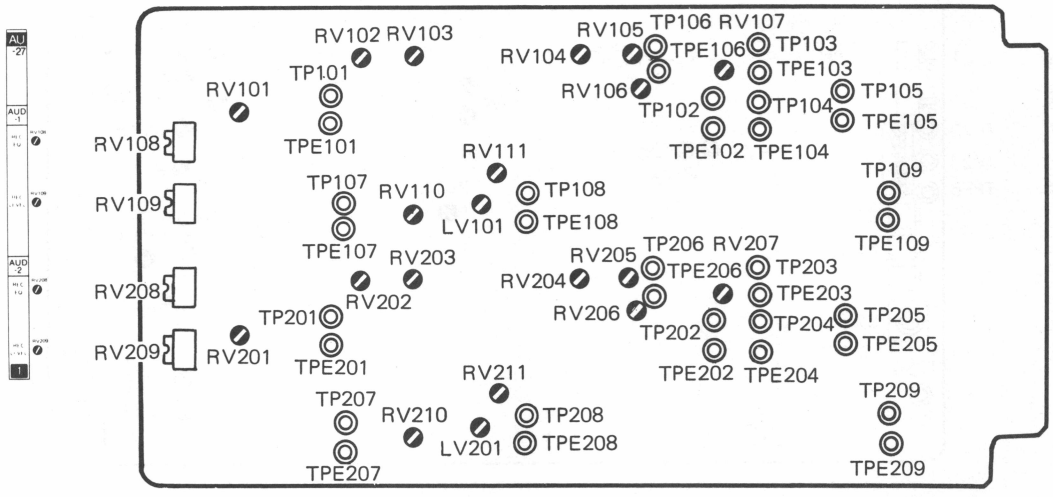
Step. 2 Adjustment MOTOR Board



TP – ϕ1 = 80 ± 5Hz
◐ RT301

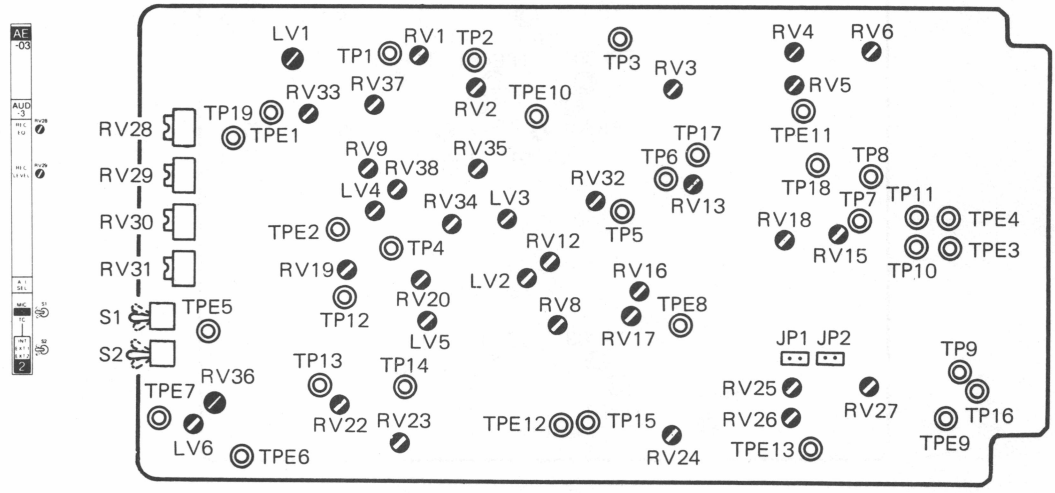
SECTION 12
AUDIO SIGNAL SYSTEM ALIGNMENT

AU-27 Board

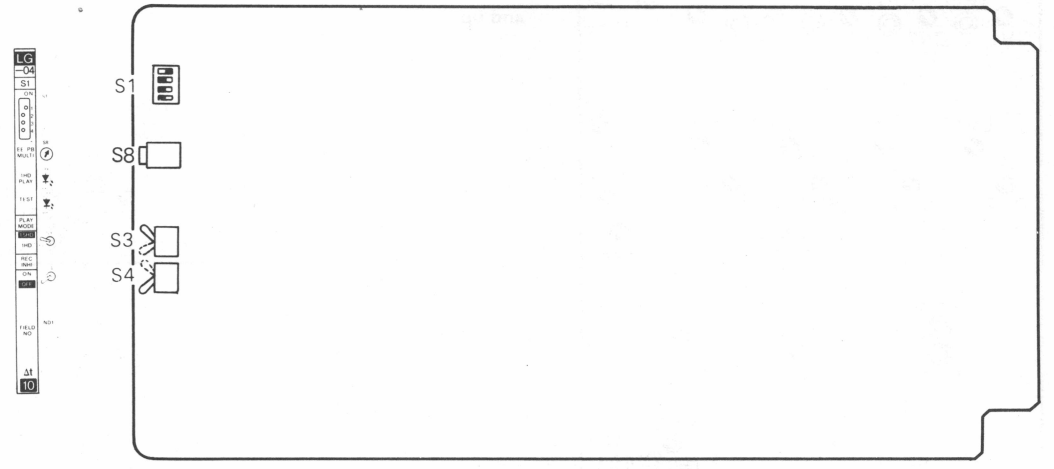


AE-03 Board

1-606-671-13 and up

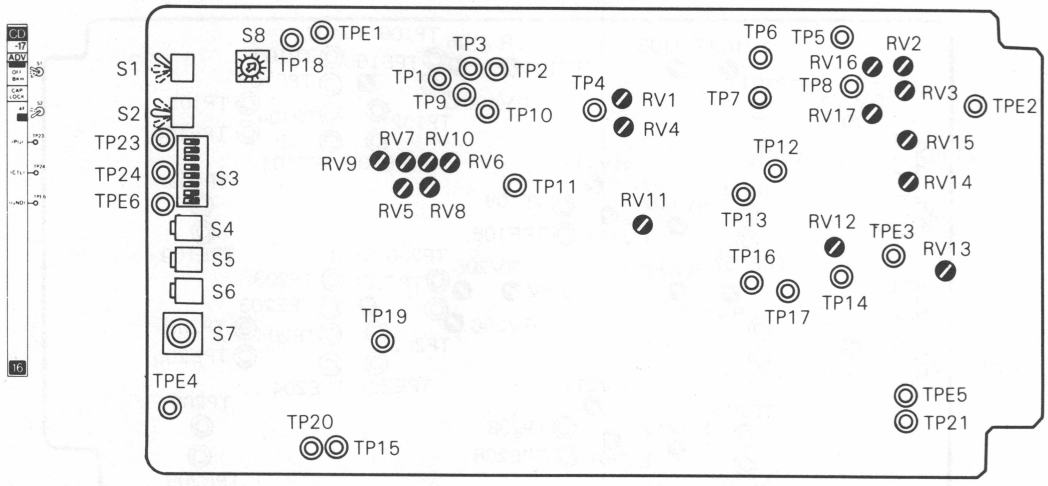


LG-04 Board

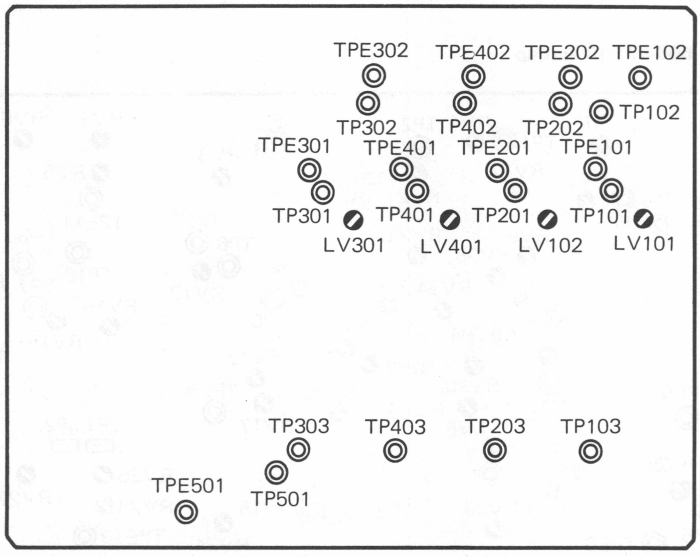


CD-17 Board

1-606-705-12 and up

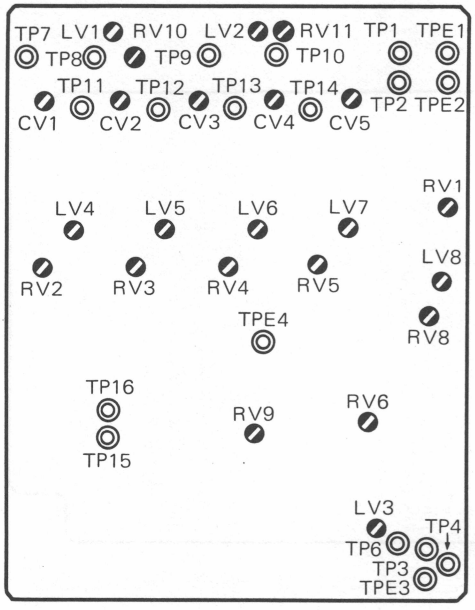


AP-06 Board



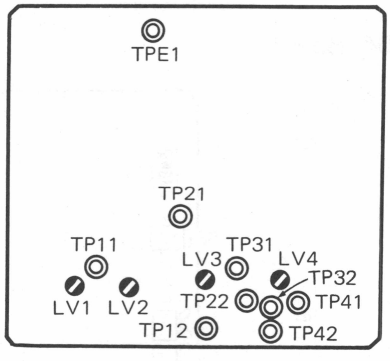
BE-02 Board

1-606-674-13 and up

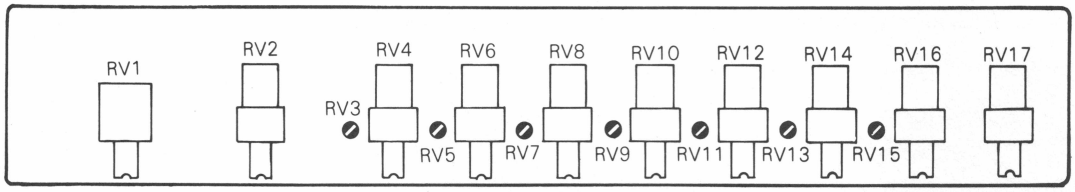


BE-03 Board

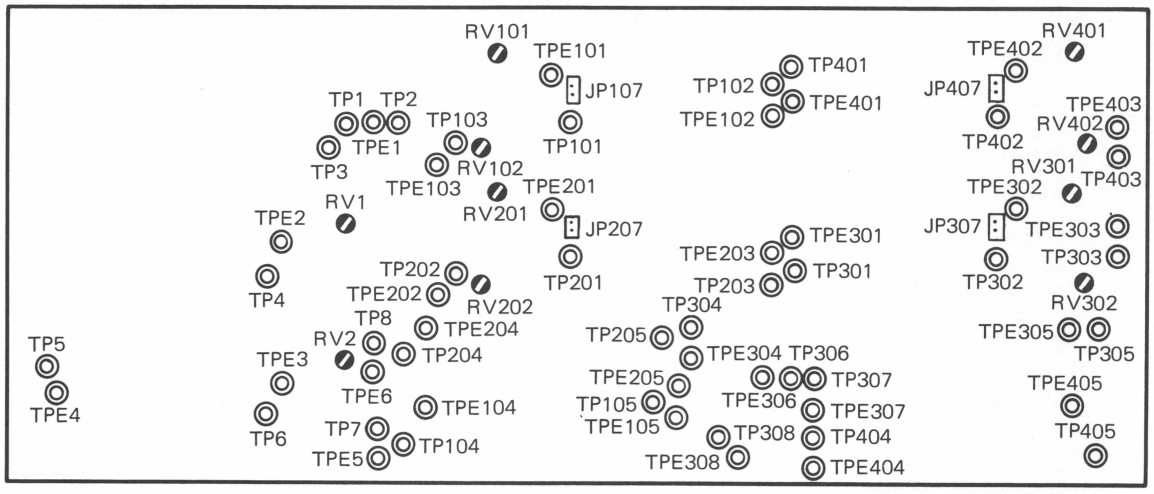
1-606-675-12 and up



VR-05 Board



LA-02 Board



12-1. LINE AMPLIFIER OFFSET AND OUTPUT LEVEL ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Digital Voltmeter
Distortion Analyzer
Mode of VTR; STOP
Setting of Switches & Controls;
TAPE/EE Sel: INPUT
AUDIO-1/2/3 REC Cont: push
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
no signal → 1 kHz/+8 dBm

Step 1. Line Amplifier Offset Adjustment
Disconnect the AUDIO-1/2/3 LINE INPUT connectors. Pull out JP107, 207, 307 and CN608 on the LA-02 board.

	LA-02 Baord	DVM
AUDIO-1:	TP101-TPE101 =	0 ± 1 mVdc ⊘ RV101/LA-02
AUDIO-2:	TP201-TPE201 =	0 ± 1 mVdc ⊘ RV201/LA-02
AUDIO-3:	TP302-TPE302 =	0 ± 1 mVdc ⊘ RV301/LA-02
R Monitor:	TP4-TPE2 =	0 ± 1 mVdc ⊘ RV1/LA-02
L Monitor:	TP6-TPE3 =	0 ± 1 mVdc ⊘ RV2/LA-02

Step 2. Line Output Level Adjustment
Feed +8 dBm at 1 kHz to AUDIO-1/2/3 LINE INPUT connectors and plug in JP107, 207, 307 and CN608 on the LA-02 board.

	LA-02 Board	DVM
AUDIO-1:	TP103-TPE103 =	77.46 ± 1 mV ⊘ RV3/VR-05
AUDIO-2:	TP202-TPE202 =	77.46 ± 1 mV ⊘ RV7/VR-05
AUDIO-3:	TP303-TPE303 =	77.46 ± 1 mV ⊘ RV11/VR-05

	Distortion Analyzer
AUDIO-1 LINE OUTPUT =	+8 ± 0.1 dBm ⊘ RV102/LA-02
AUDIO-2 LINE OUTPUT =	+8 ± 0.1 dBm ⊘ RV202/LA-02
AUDIO-3 LINE OUTPUT =	+8 ± 0.1 dBm ⊘ RV302/LA-02

12-2. AUDIO LEVEL METER CALIBRATION

Connection; See section 8-4 connection 5.
Equipment; Unnecessary
Mode of VTR; STOP
Setting of Switches & Controls;
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm

Adjustment
AUDIO LEVEL METER = 0 VU ± 0.2 dB
AUDIO-1: ⊘ RV107/AU-27
AUDIO-2: ⊘ RV207/AU-27
AUDIO-3: ⊘ RV3/AE-03

12-3. PB LEVEL CONTROLS CALIBRATION

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; PLAY (Use alignment tape.)
Setting of Switches & Controls;
AUD-1/2/3 PB Cont: push
REC INHIBIT Sw: ON
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
Don't care.

Adjustment
Push AUDIO-1/2/3 PB level controls. Play back 0 VU for NTSC, +8 dBm for PAL/SECAM/PAL-M at 1 kHz of alignment tape and adjust as follows.

AUDIO LINE OUTPUT = +8 ± 0.1 dBm
AUDIO-1: ⊘ RV5/VR-05
AUDIO-2: ⊘ RV9/VR-05
AUDIO-3: ⊘ RV13/VR-05

Adjustment of ⊘ RV5, RV9 and RV13 can be done by opening the function control panel (Refer to section 1-6-2).

12-4. PB FREQ. RESPONSE ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; PLAY (Use alignment tape.)
Setting of Switches & Controls;
AUDIO-1/2/3 PB Cont: pull
REC INHIBIT Sw: ON
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
Don't care.

Step 1.
Set A-3 SEL switch (S1/AE-03) to LINE and play back −10 VU for NTSC, −2 dBm for PAL/SECAM/PAL-M at 1 kHz of alignment tape.
Pull AUDIO-1/2/3 PB level controls and set AUDIO-1/2/3 LINE OUTPUT levels as follows.

AUDIO LINE OUTPUT = −2 dBm
AUDIO-1 PB Cont (RV6/VR-05)
AUDIO-2 PB Cont (RV10/VR-05)
AUDIO-3 PB Cont (RV14/VR-05)

Step 2.
Play back −10 VU for NTSC, −2 dBm for PAL/SECAM/PAL-M at 10 kHz of alignment tape.

AUDIO LINE OUTPUT = $-2\,^{+1.5}_{-3.0}$ dBm
AUDIO-1: ⊘RV102/AU-27
AUDIO-2: ⊘RV202/AU-27
AUDIO-3: ⊘RV1/AE-03

Step 3.
Play back −10 VU for NTSC, −2 dBm for PAL/SECAM/PAL-M at 50 Hz of alignment tape.

AUDIO LINE OUTPUT = $-2\,^{+1.5}_{-3.0}$ dBm
AUDIO-1: ⊘RV103/AU-27
AUDIO-2: ⊘RV203/AU-27
AUDIO-3: ⊘RV2/AE-03

Step 4.
Play back −10 VU for NTSC, −2 dBm for PAL/SECAM/PAL-M at 100 Hz of alignment tape and check the AUDIO-1/2/3 LINE OUTPUT levels.

AUDIO-1/2/3 LINE OUTPUT = $-2\,^{+1.5}_{-3.0}$ dBm

If not, repeat steps 3 and 4.

Step 5.
Play back −10 VU for NTSC, −2 dBm for PAL/SECAM/PAL-M at 50 Hz through 15 kHz of alignment tape continuously and check the frequency response.

AUDIO-1/2/3 LINE OUTPUT = $-2\,^{+1.5}_{-3.0}$ dBm

If not, repeat steps 1 through 5.

Step 6.
After adjustment, perform section 12-3 "PB Level Controls Calibration".

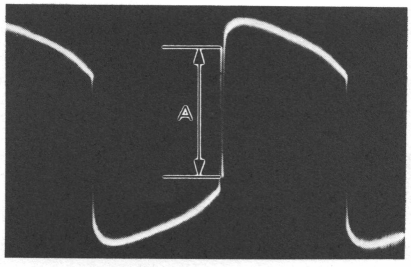
12-5. PB CTL LEVEL ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; PLAY (Use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: ON
Input Signal (AUDIO LINE IN);
Don't care.

Adjustment CD-17 Board
Play back 100% WHITE of alignment tape.

For NTSC/PAL-M

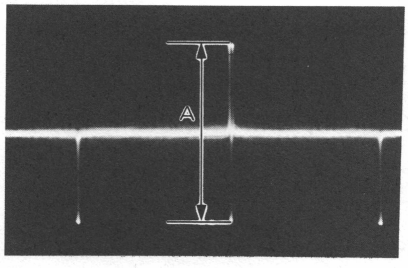
TP24



A = 4 ± 0.2V
◐ RV13

For PAL/SECAM

TP24



A = 3 ± 0.2Vp-p
◐ RV13

12-6. AUDIO ERASE OSCILLATOR FREQUENCY AND LEVEL ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Frequency Counter
Mode of VTR; REC (Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
Don't care.

Adjustment BE-02 Board

Erase Osc Freq.: TP4-TPE3 = 200kHz ± 200Hz
(Freq. Counter) ◐ RV7
(Mounted on BE-02 with board No. 1-606-674-11/12 only.)

Erase Osc Level: TP3-TPE3 = 4.0 ± 0.2 Vp-p
(Oscilloscope) * ◐ RV8

* If the level is not adjusted, turn ◐ LV8/BE-02 for maximum level and readjust ◐ RV8.
In case of turning ◐ LV8, sections 12-11 step 3 through 12-14 and 12-22 must be performed.

12-7. SYNC ERASE (V/S Head) CURRENT ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC (Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
Don't care.

Step 1.
Set ◐ RV5/BE-02 as follows.

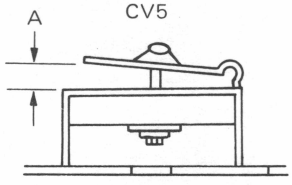
Step 2.
Place machine in record mode.

TP1-TPE1/BE-02 = Maximum
◐ LV7/BE-02
◐ CV5/BE-02

If the clearance "A" of ◐ CV5/BE-02 is wider than 3 mm, change the value of C5/BE-02 to 470pF/500V and repeat from the beginning of step 2.
If the peak level is not obtained even if the clearance of ◐ CV5/BE-02 is zero, change the value of C5/BE-02 to 750pF/500V and repeat from the beginning of step 2.

Part Information

Description				Sony Part No.
CAP, MICA	470pF	500V	5%	1-109-573-00
CAP, MICA	750pF	500V	5%	1-109-578-00



Step 3.
TP1-TPE1/BE-02 = 240 ± 10 mVp-p
◐ RV5/BE-02

12-8. VIDEO (V/S Head)/CTL ERASE FREQUENCY AND CURRENT ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Frequency Counter
Oscilloscope
Mode of VTR; REC (Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
Don't care.

Step 1.
For BE-02 with board No. 1-606-674-11 & 12

Place machine in record mode and check the oscillating frequency.

TP2-TPE2/BE-02 = 130 ± 20 kHz
(Freq. Counter)

If not, change the value of C6 as follows.
Frequency is low.;Change to 1500pF or 1600pF/500V.
Frequency is high.;Change to 2000pF or 2200pF/500V.

Part Information

Description				Sony Part No.
CAP, MICA	1500pF	500V	5%	1-109-585-00
CAP, MICA	1600pF	500V	5%	1-109-586-00
CAP, MICA	2000pF	500V	5%	1-109-588-00
CAP, MICA	2200pF	500V	5%	1-109-589-00

For BE-02 with board No. 1-606-674-13 & up

Place machine in record mode and check the oscillating frequency.

TP2-TPE2/BE-02 = 118 ± 5 kHz
(Freq. Counter)

If not, change the value of C6 as follows.
Frequency is low.;Change to 2000pF or 2200pF/500V.
Frequency is high.;Change to 2700pF or 3000pF/500V.

Part Information

Description				Sony Part No.
CAP, MICA	2000pF	500V	5%	1-109-588-00
CAP, MICA	2200pF	500V	5%	1-109-589-00
CAP, MICA	2700pF	500V	5%	1-109-591-00
CAP, MICA	3000pF	500V	5%	1-109-592-00

Step 2.
With machine still in record mode, adjust as follows.

TP2-TPE2/BE-02 = 450 ± 10 mV
(Oscilloscope) ◐ RV1/BE-02

12-9. AUDIO ERASE CURRENT ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC ➞PLAY & INSERT
(Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
Don't care.

Step 1.
Set ⊘ RV2, RV3 and RV4 as follows.

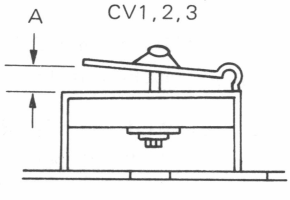
Step 2. Adjustment BE-02 Board
Place machine in record mode and adjust as follows.

AUDIO-1: TP7-TPE3 = Maximum Level ⊘ CV1 ⊘ LV4
AUDIO-2: TP8-TPE3 = Maximum Level ⊘ CV2 ⊘ LV5
AUDIO-3: TP9-TPE3 = Maximum Level ⊘ CV3 ⊘ LV6

If the clearance "A" of ⊘ CV1(AUD-1), CV2(AUD-2) or CV3(AUD-3) is wider than 3 mm, change the value of C1(AUD-1), C2(AUD-2) or C3(AUD-3) to 150pF/500V and repeat from the beginning of step 2.
If the peak level is not obtained even if the clearance of ⊘ CV1(AUD-1), CV2(AUD-2) or CV3(AUD-3) is zero, change the value of C1(AUD-1), C2(AUD-2) or C3(AUD-3) to 470pF/500V and repeat from the beginning of step 2.

Part Information

Description				Sony Part No.
CAP, MICA	150pF	500V	5%	1-109-677-00
CAP, MICA	470pF	500V	5%	1-109-689-00



Step 3. Adjustment BE-02 Board
With machine still in record mode, adjust as follows.

AUDIO-1: TP7-TPE3 = 230 ± 10 Vp-p ⊘ RV2
AUDIO-2: TP8-TPE3 = 230 ± 10 Vp-p ⊘ RV3
AUDIO-3: TP9-TPE3 = 230 ± 10 Vp-p ⊘ RV4

Step 4.
Play back the recording, place machine in AUDIO-2 INSERT mode and adjust as follows.

TP7-TPE3/BE-02 = less than 10 Vp-p
⊘ LV1/BE-02

Still in playback mode, place machine in AUDIO-1 INSERT mode and check as follows.

TP8-TPE3/BE-02 = less than 10 Vp-p
If not, fine tune ⊘ LV1
and repeat step 4.

If the voltage at TP7 and/or TP8 does not meet the specifications, fine tune * ⊘ RV10/BE-02 and repeat from the beginning of step 4.

*RV10/BE-02
Since RV10 is not mounted on the BE-02 with board No. 1-606-674-11/12, select R173/BE-02 within the value of 0 to 4.7 ohms and repeat step 4.

After completion, return to step 3 and if ⊘ RV2 and/or ⊘ RV3 is readjusted, proceed to the step 4, then confirm from steps 3 and 4.

12-10. CTL (Audio/CTL Head) BIAS CURRENT ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC (Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
Don't care.

Adjustment BE-02 Board
TP6-TPE4 = Maximum
⊘ LV3

TP6-TPE4 = 150 ± 10 Vp-p
⊘ RV6

12-11. AUDIO (Audio/CTL Head) BIAS LEAK AND BIAS CURRENT ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Distortion Analyzer
Mode of VTR; REC (Don't use alignment tape.)
Setting of Switches & Controls;
AUDIO MONITOR Sel: AUDIO-1,2, or 3
REC INHIBIT Sw: OFF
TAPE/EE Sel: BVH-2000/PS/PM 00 model
INPUT
BVH-2000/PS/PM 02 model
BVH-2500/P
INPUT → TAPE
A-3 SEL Sw(S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
no signal → 1 kHz/+8 dBm

Step 1.
Open the level control panel and the rear panel, remove all connectors from the AP-06 board, and take off the AP-06 board. Coming round to the rear, put the AP-06 board in the VTR and connect CN351, 353 and 354 to the proper positions on the board.

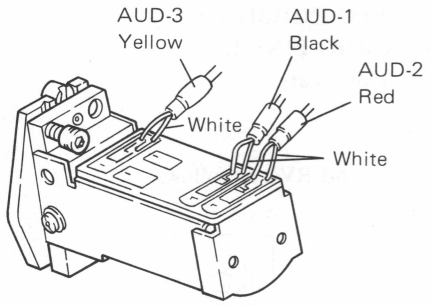
Step. 2 Adjustment AP-06 Board
Perform the following adjustments in record mode.

AUDIO-1: TP101-TPE101 = Minimum Bias Leak ⊘LV101
AUDIO-2: TP201-TPE201 = Minimum Bias Leak ⊘LV201
AUDIO-3: TP301-TPE301 = Minimum Bias Leak ⊘LV301

After the adjustments, reinsert the AP-06 board to the proper position and connect all connectors to the board.

Step 3.
Disconnect AUDIO LINE INPUT and connect distortion analyzer to AUDIO MONITOR OUTPUT.
Set TAPE/EE selector to INPUT, A-3 SEL switch (S1/AE-03) to LINE and BIAS LEVEL ADJ controls (RV1, 2, 3)/BE-04 to midrange.

Step 4.
Connect oscilloscope across white lead and GND on the Audio/CTL R/P head as shown below and adjust as follows.



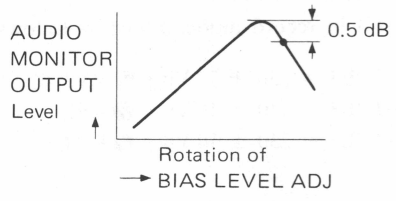
AUDIO-1 = Maximum Level ⊘LV1/BE-03
AUDIO-2 = Maximum Level ⊘LV2/BE-03
AUDIO-3 = Maximum Level ⊘LV3/BE-03
(Oscilloscope)

Step 5.
For BVH-2000/PS/PM 00 Model
Feed +8 dBm at 1 kHz to AUDIO-1(2, 3) LINE INPUT.
Turn A1(2, 3) BIAS LEVEL ADJ controls (RV1, 2, 3)/BE-04 fully counterclockwise.
Place machine in record mode and turn the A1(2, 3) BIAS LEVEL ADJ controls (RV1, 2, 3)/BE-04 slowly clockwise.
While playing back the recording, set AUDIO MONITOR selector to AUDIO-1(2, 3), find out 0.5 dB over the peak position and set A1(2, 3) BIAS LEVEL ADJ controls (RV1, 2, 3)/BE-04 appropriately.

For BVH-2000/PS/PM 02 Model, BVH-2500/P
Feed +8 dBm at 1kHz to AUDIO-1(2, 3) LINE INPUT.
Set TAPE/EE selector to TAPE and AUDIO MONITOR selector to AUDIO-1(2, 3).

Turn A1(2, 3) BIAS LEVEL ADJ controls (RV1, 2, 3)/BE-04 fully counterclockwise and place machine in record mode.

Turn A1(2, 3) BIAS LEVEL ADJ controls (RV1, 2, 3)/BE-04 slowly clockwise and stops at the 0.5 dB position over the peak as follows.



12-12. RECORDING LEVEL ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; See respective steps.
Setting of Switches & Controls;
AUDIO MONITOR Sel: AUDIO-1, 2 or 3
AUDIO-1/2/3 REC Cont: push
AUDIO-1/2/3 PB Cont: push
REC INHIBIT Sw: ON → OFF
TAPE/EE Sel: BVH-2000/PS/PM 00 model
INPUT
BVH-2000/PS/PM 02 model
BVH-2500/P
INPUT → TAPE
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm

Step 1.
Set TAPE/EE selector to INPUT and A-3 SEL switch (S1/AE-03) to LINE.
During STOP mode, push AUDIO-1/2/3 REC controls and check the AUDIO-1/2/3 LINE OUTPUT levels as follows.

AUDIO-1/2/3 LINE OUTPUT = +8 dBm

If not, perform section 12-1 "Line Amplifier Offset & Output Level Adjustment".

Step 2.
Set REC INHIBIT switch to ON and play back 0VU for NTSC, +8 dBm for PAL/SECAM/PAL-M at 1 kHz of alignment tape. Push AUDIO-1/2/3 PB controls and check the AUDIO-1/2/3 LINE OUTPUT levels as follows.

AUDIO-1/2/3 LINE OUTPUT = +8 dBm

If not, perform section 12-3 "PB Level Controls Calibration".

Step 3.
Set REC INHIBIT switch to OFF. Using ordinary tape, make a recording of +8 dBm at 1 kHz and play back the recording. Check AUDIO-1/2/3 LINE OUTPUT levels as follows.

AUDIO-1/2/3 LINE OUTPUT = +8 ± 0.1 dBm

If not, measure the levels as against the specifications and proceed to the next step.

Step 4.
For BVH-2000/PS/PM 00 Model
Connect distortion analyzer to AUDIO MONITOR OUTPUT and set AUDIO MONITOR selector to AUDIO-1, 2 or 3.
With record mode, turn following pots a little and play back the recording, and then adjust as follows.

AUDIO-1 LINE OUTPUT = +8 ± 0.1 dBm ◐ RV109/AU-27
AUDIO-2 LINE OUTPUT = +8 ± 0.1 dBm ◐ RV209/AU-27
AUDIO-3 LINE OUTPUT = +8 ± 0.1 dBm ◐ RV29/AE-03

For BVH-2000/PS/PM 02 Model, BVH-2500/P
Connect distortion analyzer to AUDIO MONITOR OUTPUT and set TAPE/EE selector to TAPE and AUDIO MONITOR selector to AUDIO-1, 2 or 3.
Place machine in record mode and correct the recording level according to the levels measured in step 3 using following pots.

AUDIO-1: ◐ RV109/AU-27
AUDIO-2: ◐ RV209/AU-27
AUDIO-3: ◐ RV29/AE-03

Step 5.
Play back the recording and check whether the AUDIO-1/2/3 LINE OUTPUT levels meet the levels measured in step 3.
If not, repeat steps 4 and 5 a few times.

12-13. CONFI LEVEL ADJUSTMENT (For BVH-2000 02 Model/BVH-2500)

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; See respective steps.
Setting of Switches & Controls;
AUDIO MONI Sel: AUD-1 → AUD-1, 2, 3
AUDIO-1/2/3 REC Cont: push
AUDIO-1/2/3 PB Cont: push
REC INHIBIT Sw: ON → OFF
TAPE/EE Sel: INPUT → TAPE
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm

Step 1.
Perform the same procedures in section 12-12 steps 1 and 2.

Step 2.
With machine still in playback of alignment tape, set AUDIO MONITOR selector to AUDIO-1 and adjust as follows.

AUDIO MONITOR OUTPUT = +8 dBm
MONITOR/PHONES Control (RV1/VR-05)

Step 3.
Set REC INHIBIT switch to OFF and TAPE/EE selector to TAPE. Using ordinary tape, make a recording of +8 dBm at 1 kHz and check and/or adjust as follows.

AUDIO MONITOR OUTPUT = +8 ± 0.1 dBm
AUDIO-1: ⊘ RV106/AU-27
AUDIO-2: ⊘ RV206/AU-27
AUDIO-3: ⊘ RV4/AU-27

12-14. RECORD AMPLIFIER FREQUENCY RESPONSE ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; See respective steps.
Setting of Switches & Controls;
AUDIO-1/2/3 REC Cont: push
AUDIO-1/2/3 PB Cont: push
REC INHIBIT Sw: ON → OFF
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm → 1 kHz/−2 dBm
→ 10 kHz/−2 dBm

Step 1.
Perform the same procedures in section 12-12 steps 1 and 2.

Step 2.
Set REC INHIBIT switch to OFF. Using ordinary tape, make a short recording of −2 dBm at 1 kHz and 10 kHz. Play back the recording and check the level of 10kHz with reference to 1 kHz as follows.

AUDIO-1/2/3 LINE OUTPUT: 10 kHz = 0 ± 0.5 dB
(reference to 1 kHz)

If not, turn the following pots a little and repeat from the beginning of step 2.

AUDIO-1: ⊘ RV108/AU-27
AUDIO-2: ⊘ RV208/AU-27
AUDIO-3: ⊘ RV28/AE-03

12-15. CROSSTALK LEVEL ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; REC → PLAY/INSERT
(Don't use alignment tape.)
Setting of Switches & Controls;
AUDIO-1/2/3 REC Cont: push
AUDIO-1/2/3 PB Cont: push
REC INHIBIT Sw: OFF
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
no signal → 1 kHz/+8 dBm → 15, 20, 25 kHz/ +8 dBm

Step 1. AUD-1 to AUD-2 Crosstalk Adjustment
Disconnect AUDIO-2 LINE INPUT and record a few minutes of no signal on AUDIO-2.
Feed +8 dBm at 1 kHz to AUDIO-1 LINE INPUT. Play back the recording and record over recording with AUDIO-1 INSERT mode, then adjust as follows.

AUDIO-2 LINE OUTPUT = Minimum
⊘ RV110/AU-27

Next, change the AUDIO-1 LINE INPUT to +8 dBm at 15 kHz, 20 kHz and 25 kHz in turn and adjust as follows.

AUDIO-2 LINE OUTPUT ≦ −7 dBm
⊘ RV111/AU-27
⊘ LV101/AU-27

Step 2. AUD-2 to AUD-1 Crosstalk Adjustment
Adjust AUDIO-2 to AUDIO-1 crosstalk level in a similar manner to step 1.

AUDIO-1 LINE OUTPUT = Minimum (1 kHz)
⊘ RV210/AU-27

AUDIO-1 LINE OUTPUT ≦ −7 dBm (15 kHz, 20 kHz, 25 kHz)
⊘ RV211/AU-27
⊘ LV201/AU-27

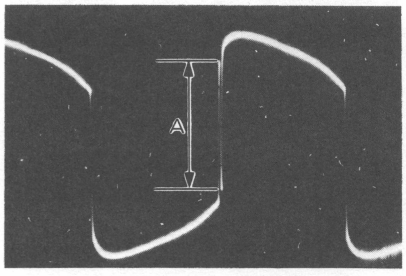
12-16. REC CTL LEVEL ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY
(Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
Don't care.

Adjustment CD-17 Board
Place machine in recored mode and play back the recording, then confirm as follows.

For NTSC/PAL-M

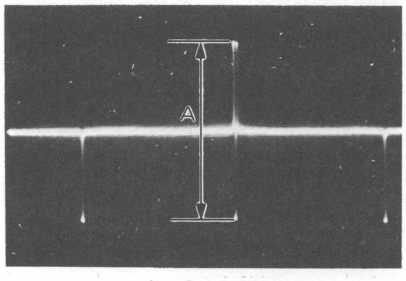
TP24



A = 4 ± 0.2V

For PAL/SECAM

TP24



A = 3 ± 0.2Vp-p

If not, place machine in record mode and turn ⊘ RV11/CD-17 a little while recording. Play back the recording and repeat the confirmation.

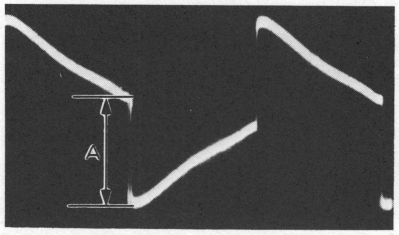
12-17. CONFI CTL LEVEL ADJUSTMENT (For BVH-2000 02 Model/BVH-2500)

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC (Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
TAPE/EE Sel: TAPE
Input Signal (AUDIO LINE IN);
Don't care.

Adjustment CD-17 Board

For NTSC/PAL-M

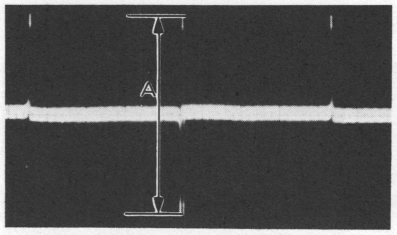
TP14/CD-17



A = 0.5 ± 0.1V
RV12

For PAL/SECAM

TP14/CD-17



A = 0.19 ± 0.05Vp-p
RV12

12-18. PB CTL TO AUDIO-3 CROSSTALK ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY/INSERT → PLAY
(Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
no signal

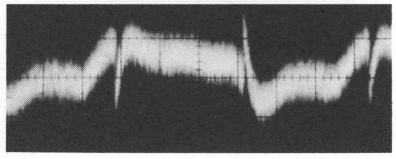
Adjustment

Disconnnect AUDIO-3 LINE INPUT and record a few minutes of no signal on AUDIO-3.
Play back the recording and record over recording with AUDIO-3 INSERT mode.
Play back the entire recording and adjust as follows.

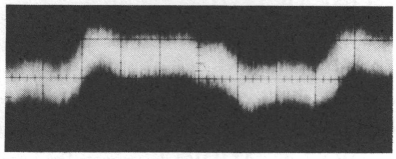
For NTSC/PAL-M

INCORRECT

AUDIO-3 LINE OUTPUT



CORRECT

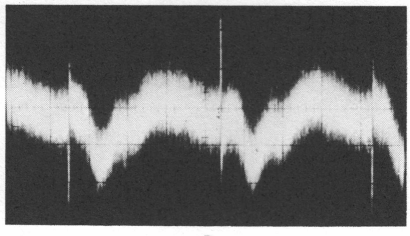


Minimum Crosstalk
RV32/AE-03

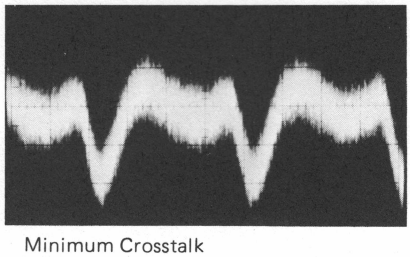
For PAL/SECAM

INCORRECT

AUDIO-3 LINE OUTPUT



CORRECT



Minimum Crosstalk
RV32/AE-03

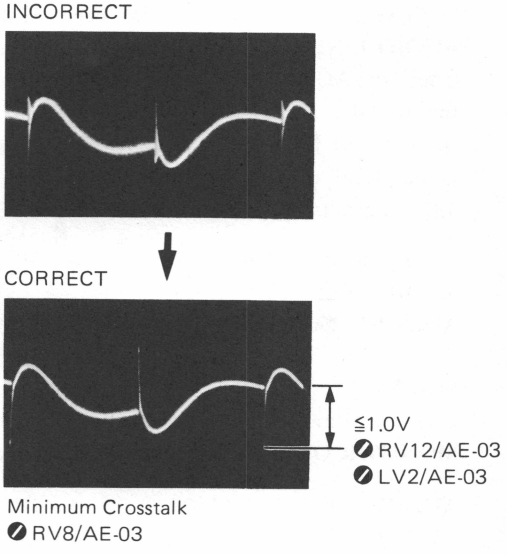
12-19. CTL TO AUD-3 CROSSTALK ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY/VIDEO ASSEMBLE
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
no signal

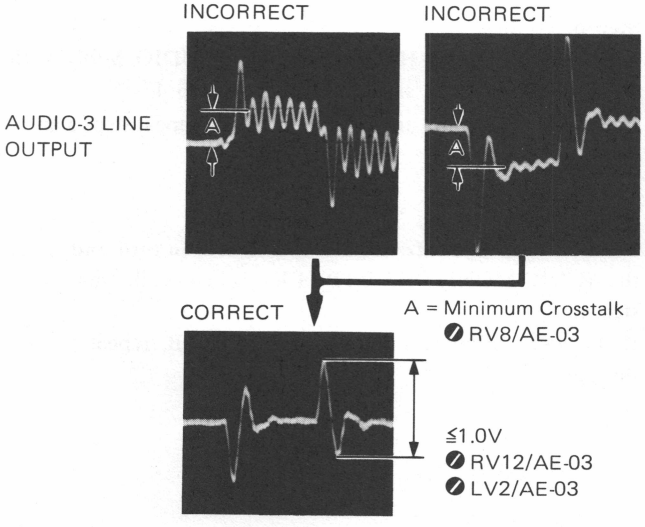
Adjustment

Disconnnect AUDIO-3 LINE INPUT and record a few minutes of no signal on AUDIO-3.
Play back the recording and record over recoding with VIDEO ASSEMBLE mode, then adjust as follows.

For NTSC/PAL-M



For PAL/SECAM



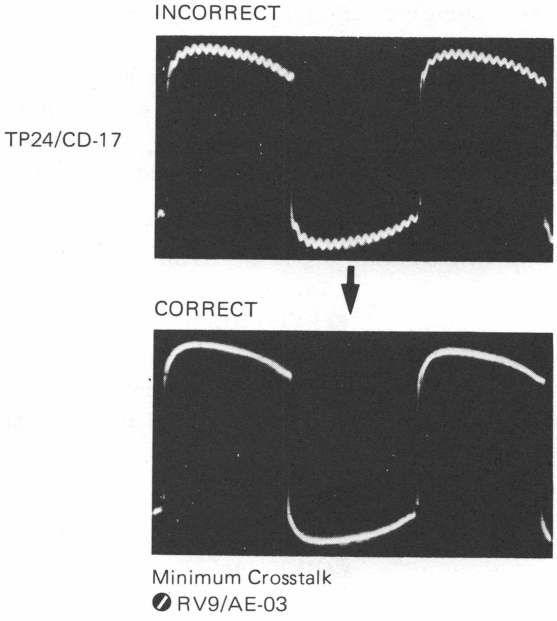
12-20. REC AUD-3 TO PB CTL CROSSTALK ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY/AUD-3 INSERT
(Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
no signal → 1 kHz/+18 dBm

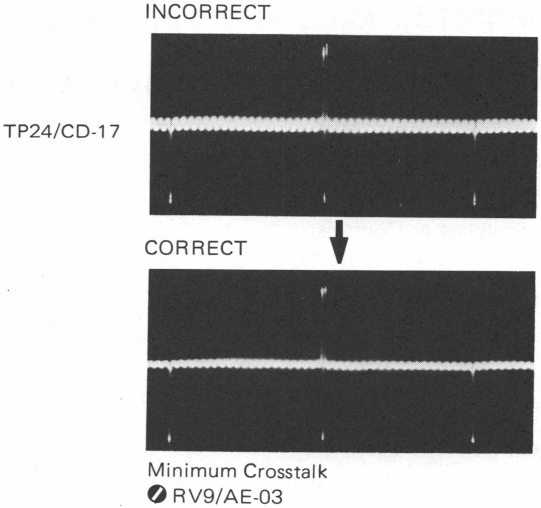
Adjstment

Disconnect AUDIO-3 LINE INPUT and record a few minutes of no signal on AUDIO-3.
Connect AUDIO-3 LINE INPUT and feed +18 dBm at 1 kHz.
Play back the recording and record over recording with AUDIO-3 INSERT mode, then adjust as follows.

For NTSC/PAL-M



For PAL/SECAM



12-21. PLAY MODE CROSSTALK ADJUSTMENT

Connection; See section 8-4 connection 6.
Equipment; Distortion Analyzer
Mode of VTR; See respective steps.
Setting of Switches & Controls;
AUDIO-1/2/3 REC Cont: push
AUDIO-1/2/3 PB Cont: push
REC INHIBIT Sw: ON → OFF
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
See respective steps.

Step 1.
Perform the same procedures in section 12-12 steps 1 and 2.

Step 2. AUD-1 to AUD-2 Crosstalk Adjustment
Set REC INHIBIT switch to OFF and disconnect AUDIO-2 LINE INPUT. Using ordinary tape, record a few minutes of no signal on AUDIO-2.
Play back the recording and record +18 dBm at 1 kHz and 15 kHz at an interval of 1 minute over recording with AUDIO-1 INSERT mode.
Play back the entire recording and check and/or adjust as follows.

AUDIO-2 LINE OUTPUT: 1 kHz ≦ −65 dB
15 kHz ≦ −55 dB
◐ RV101/AU-27

Step 3. AUD-2 to AUD-1 Crosstalk Adjustment
Adjust AUDIO-2 to AUDIO-1 crosstalk level in a similar manner to step 2.

AUDIO-1 LINE OUTPUT: 1 kHz ≦ −65 dB
15 kHz ≦ −55 dB
◐ RV201/AU-27

12-22. MONITOR AMPLIFIER FREQUENCY RESPONSE ADJUSTMENT (For BVH-2000 02 Model/BVH-2500)

Connection; See section 8-4 connection 5.
Equipment; Distortion Analyzer
Mode of VTR; See respective steps.
Setting of Switches & Controls;
AUDIO MONITOR Sel: AUD-1/2/3
AUDIO-1/2/3 REC Cont: push
AUDIO-1/2/3 PB Cont: push
REC INHIBIT Sw: ON → OFF
TAPE/EE Sel: INPUT → TAPE
A-3 SEL Sw (S1/AE-03): LINE
Input Signal (AUDIO LINE IN);
See respective steps.

Step 1.
Perform the same procedures in section 12-12 steps 1 and 2.

Step 2.
With machine still in playback of alignment tape, set AUDIO MONITOR selector to AUDIO-1 and adjust MONITOR/PHONES level control (RV1/VR-05) for +8 dBm at AUDIO MONITOR OUTPUT.

Step 3.
Set REC INHIBIT switch to OFF. Using ordinary tape, record −2 dBm at 10 kHz, 50 Hz and 100 Hz in turn on AUDIO-1,2 and 3.
Play back the recording and measure the levels at AUDIO MONITOR OUTPUT connector while selecting the AUDIO MONITOR selector to AUD-1, 2, and 3.

Step 4
Set TAPE/EE selector to TAPE. Feed −2 dBm at 10 kHz to AUDIO LINE INPUT and place machine in record mode.
Check the AUDIO MONITOR OUTPUT levels while selecting the AUDIO MONITOR selector to AUD-1, 2 and 3, then compare the levels at 10 kHz measured in step 3.
If the level differences are more than ±1dB, adjust with following pots.

AUDIO-1: ◐ RV104/AU-27
AUDIO-2: ◐ RV204/AU-27
AUDIO-3: ◐ RV6/AE-03

Step 5.
Feed −2 dBm at 50 Hz and check and/or adjust the AUDIO MONITOR OUTPUT levels in a similar manner to step 4.

AUDIO-1: ◐ RV105/AU-27
AUDIO-2: ◐ RV205/AU-27
AUDIO-3: ◐ RV5/AE-03

Step 6.
Feed −2 dBm at 100 Hz and check the AUDIO MONITOR OUTPUT levels in a similar manner to step 4.
If the level differences are more than ±1 dB, repeat steps 5 and 6 again.

Step 7.
Feed −2 dBm at 50 Hz, 100 Hz and 10 kHz in turn and check the AUDIO MONITOR OUTPUT levels in a similar manner to step 4.
If the level differences are more than ±1dB, repeat steps 4 through 7.

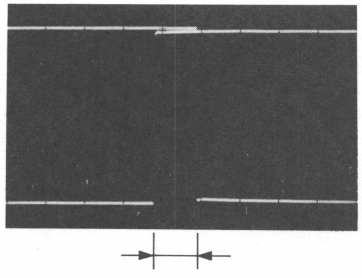
12-23. TIME CODE DUTY CYCLE ADJUSTMENT

This adjustment is necessary when make a recording or playing back of the time code.

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; STOP → REC → PLAY
(Don't use alignment tape.)
Setting of Switches & Controls;
REC INHIBIT Sw: OFF
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): TC → LINE → TC
TC INT/EXT1/EXT2 Sw (S2/AE-03): EXT2
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm

Step 1.
Set A-3 SEL switch (S1/AE-03) to TC and TC INT/EXT1/EXT2 switch (S2/AE-03) to EXT2.
Feed +8 dBm at 1 kHz to AUDIO-3 LINE INPUT.

TP8-TPE8 (GND)/AE-03
(Ext Trig: TP8)
(Trig Slope: +/–)

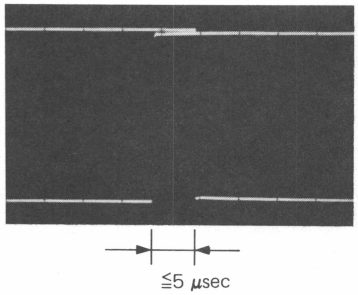


≦5 μsec
⊘ RV18/AE-03

Step 2.
Set A-3 SEL switch (S1/AE-03) to LINE and make a short recording.

Step 3.
Return A-3 SEL switch (S1/AE-03) to TC.
Play back the recording in step 2 and check and/or adjust as follows.

TP7-TPE8 (GND)/AE-03
(Ext Trig: TP7)
(Trig Slope: +/–)



≦5 μsec
⊘ RV15/AE-03

12-24. TIME CODE OUTPUT LEVEL ADJUSTMENT

This adjustment is necessary when make a recording or playing back of the time code.

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Distortion Analyzer
Mode of VTR; STOP
Setting of Switches & Controls;
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): TC
TC INT/EXT1/EXT2 Sw (S2/AE-03): EXT2
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm

Adjustment
Set A-3 SEL switch (S1/AE-03) to TC and TC INT/EXT1/EXT2 switch (S2/AE-03) to EXT2.
Feed +8 dBm at 1 kHz to AUDIO-3 LINE INPUT and connect oscilloscope and 75 ohm termination to TIME CODE OUTPUT.

TIME CODE OUTPUT = 0.5 ± 0.1 Vp-p
(Oscilloscope) ⊘ RV17/AE-03

AUDIO-3 LINE OUTPUT = +8 ± 0.1 dBm
(Distortion Analyzer) ⊘ RV16/AE-03

12-25. TIME CODE RECORDING LEVEL ADJUSTMENT

This adjustment is necessary when make a recording or playing back of the time code.

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; STOP
Setting of Switches & Controls;
TAPE/EE Sel: INPUT
A-3 SEL Sw (S1/AE-03): TC
TC INT/EXT1/EXT2 Sw (S2/AE-03): EXT2
Input Signal (AUDIO LINE IN);
1 kHz/+8 dBm

Adjustment
Set A-3 SEL switch (S1/AE-03) to TC and TC INT/EXT1/EXT2 switch (S2/AE-03) to EXT2.
Feed +8 dBm at 1 kHz to AUDIO-3 LINE INPUT.

TP19-TPE2/AE-03 = 150 ± 5 mVp-p
⊘ RV13/AE-03

12-26. REC BIAS LEAK ADJUSTMENT

Connection; See section 8-4 connection 5.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY/INSERT
Setting of Switches & Controls;
AUDIO-1/2/3 REC Cont: Pull
REC INHIBIT Sw: OFF
Input Signal (AUDIO LINE IN);
no signal
Applicable Serial No.; BVH-2000 # 23101 & up
BVH-2000PS # 22901 & up
BVH-2000PM # 20201 & up
BVH-2500 # 10701 & up
BVH-2500P # 10001 & up

Step 1.
Pull AUDIO-1/2/3 REC Level Controls and turn fully counter-clockwise. Make a recording of no signal on AUDIO-1/2/3.

Step 2. AUD-1 to AUD-2 Bias Leak Adj.
Play back the recording of step 1 and record over recording with AUDIO-1 INSERT mode, then adjust as follows.

AUDIO-2 LINE OUTPUT = Minimum Bias Leak
⊘LV202/AU-27

Step 3. AUD-2 to AUD-1 Bias Leak Adj.
Play back the recording of step 1 and record over recording with AUDIO-2 INSERT mode, then adjust as follows.

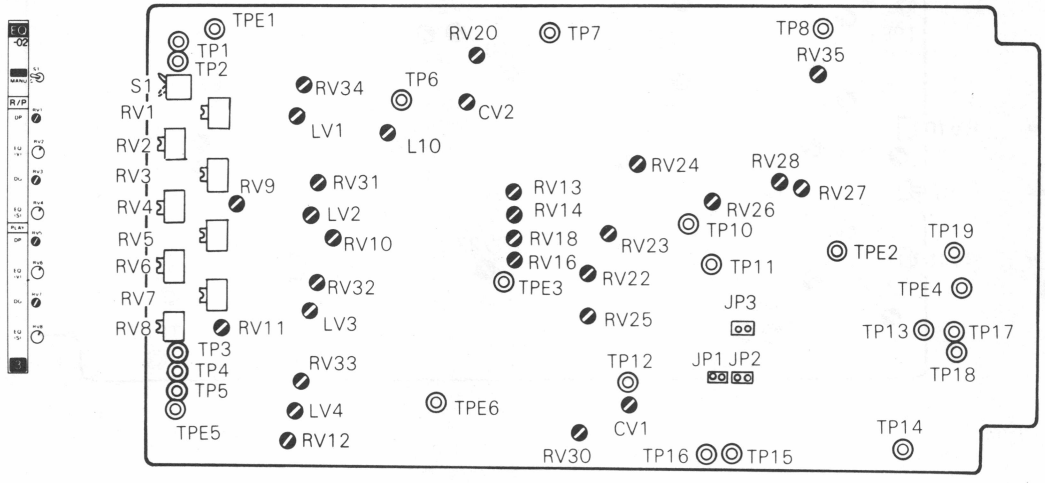
AUDIO-1 LINE OUTPUT = Minimum Bias Leak
⊘LV102/AU-27

Step 4. AUD-1/2 to AUD-3 Bias Leak Adj.
Play back the recording of step 1 and record over recording with AUDIO-1/2 INSERT mode, then adjust as follows.

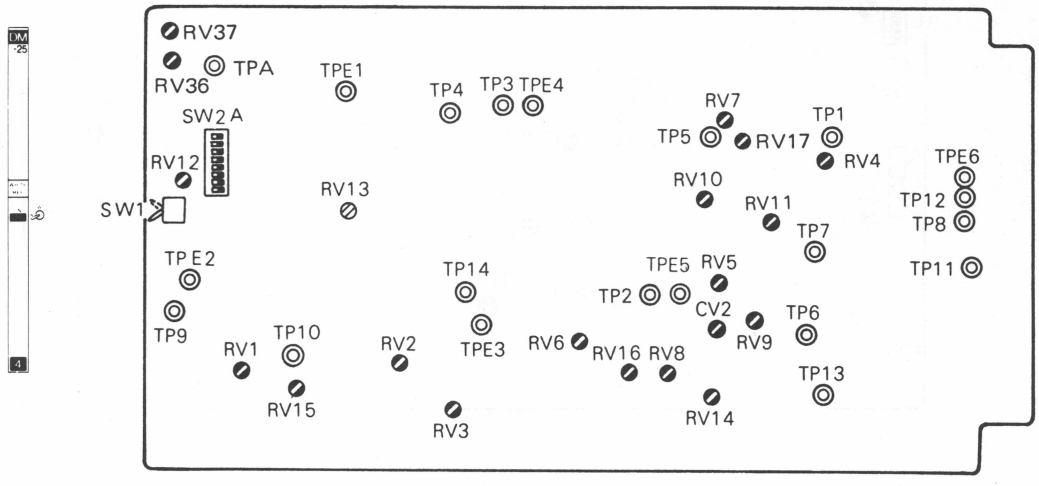
AUDIO-3 LINE OUTPUT = Minimum Bias Leak
⊘LV1/AE-03

SECTION 13
VIDEO SIGNAL SYSTEM ALIGNMENT

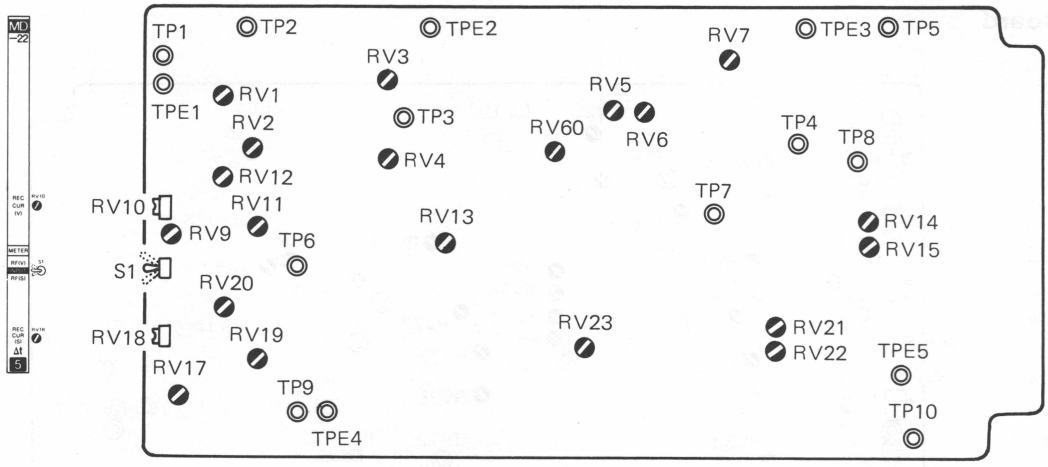
EQ-02 Board



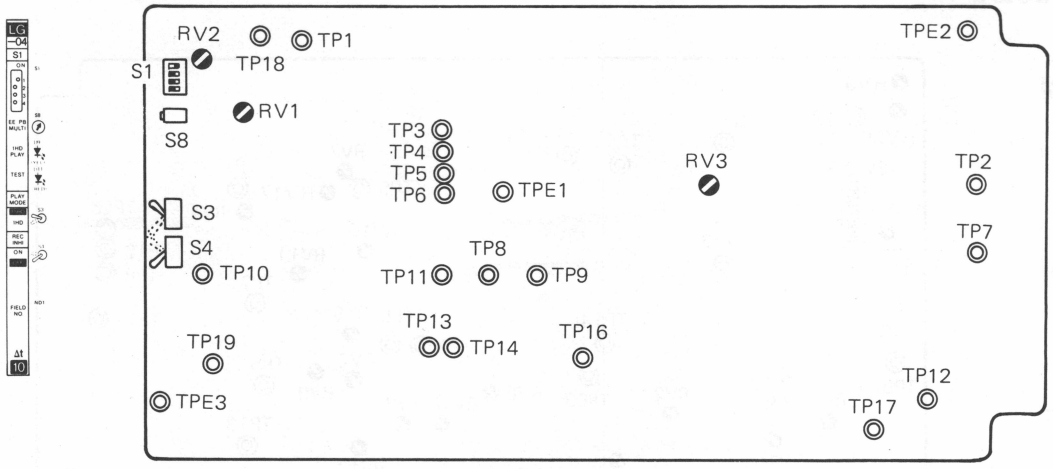
DM-25 Board



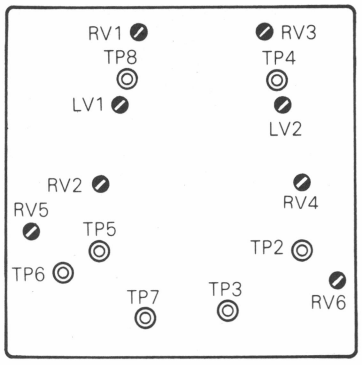
MD-22 Board



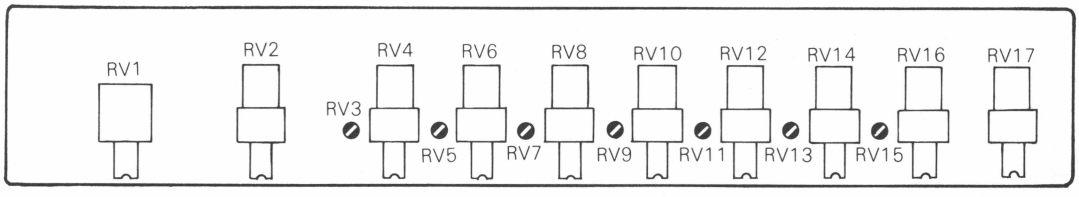
LG-04 Board



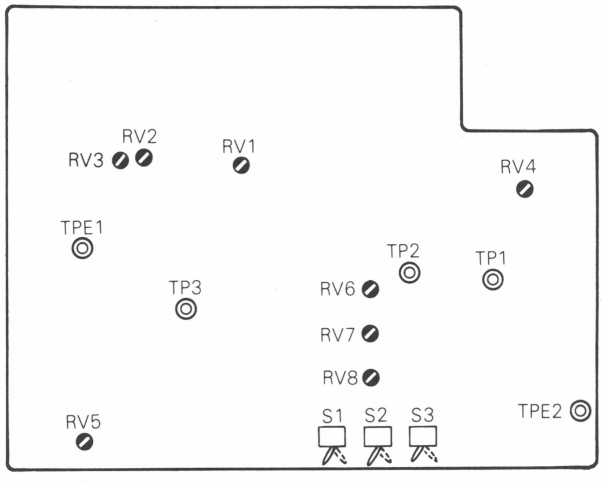
RP-09 Board



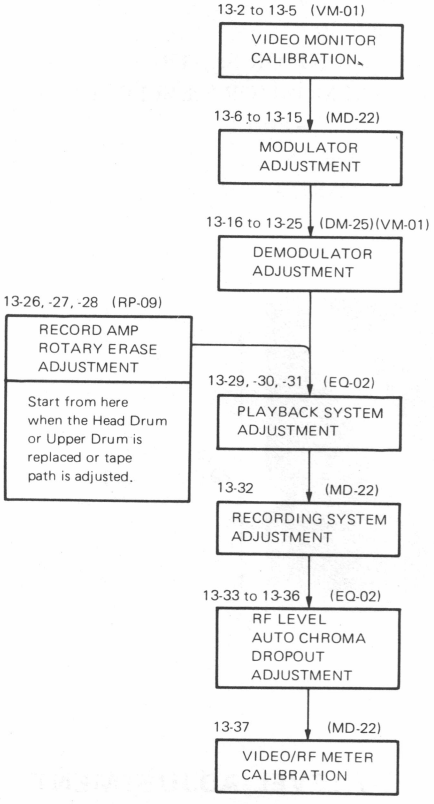
VR-05 Board



VM-01 Board



13-1. VIDEO SIGNAL SYSTEM ALIGNMENT SEQUENCE

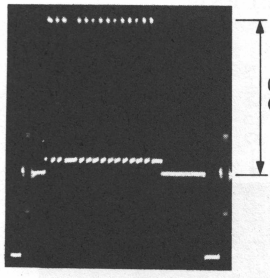


13-2. INSERT CHARACTER LEVEL ADJUSTMENT

Connection; See section 8-4 connection 3.
Equipment; Waveform Monitor
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: TBC
TAPE/EE Sel: TAPE/EE
CHAR ON/OFF Sw(S7/TC-14): ON
Input Signal (TBC MONITOR IN);
BLACK BURST

Adjustment

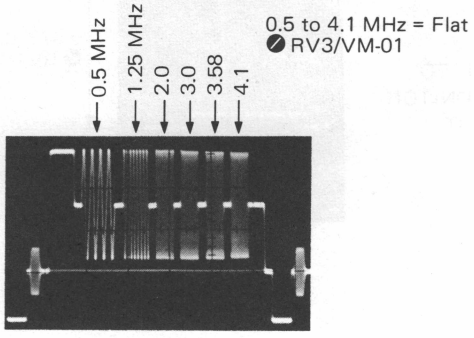
VIDEO MONITOR OUT



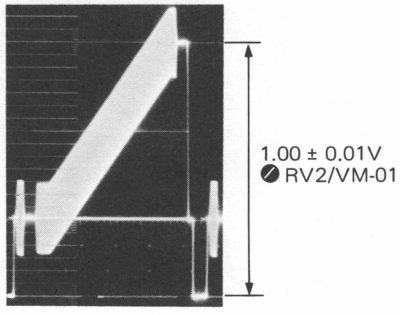
13-3. VIDEO MONITOR LEVEL AND FREQ. RESPONSE ADJUSTMENT

Connection; See section 8-4 connection 3.
Equipment; Waveform Monitor
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: TBC
TAPE/EE Sel: TAPE/EE
Input Signal (TBC MONITOR IN);
RAMP LINEARITY
MULTIBURST

Step 1.
Input Signal; MULTIBURST



Step 2.
Input Signal; RAMP LINEARITY

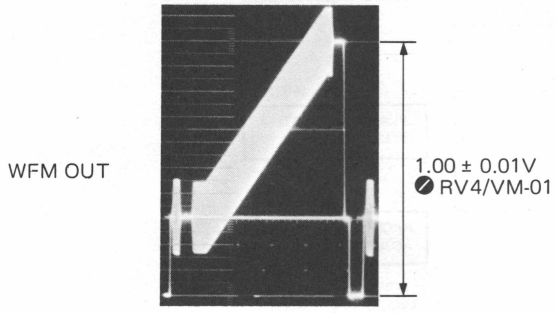


Step 3.
After the adjustment, repeat from step 1 until meet the specifications.

13-4. WFM OUTPUT LEVEL ADJUSTMENT

Connection; See section 8-4 connection 3.
Equipment; Waveform Monitor
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (TBC MONITOR IN);
RAMP LINEARITY

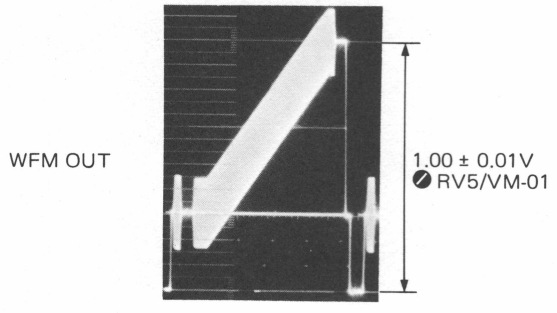
Adjustment



13-5. INPUT VIDEO LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: INPUT VIDEO
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment



13-6. +5.1V REGULATOR ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment MD Board

TP2 = +5.10 ± 0.05Vdc
◐ RV3

13-7. VIDEO LEVEL PRESET ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
Any Signal with Burst

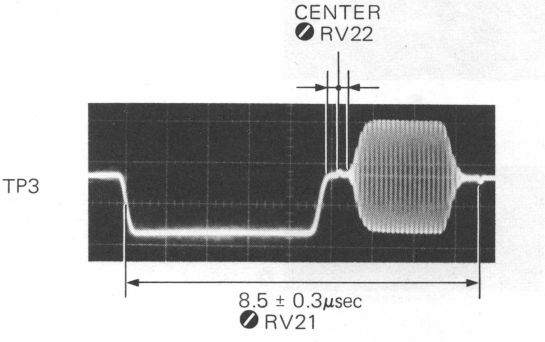
Adjustment

TP5/MD Board = −0.5 ± 0.01Vdc
◐ RV15/VR-05

13-8. MODULATOR BURST TIMING ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
Any Signal with Burst

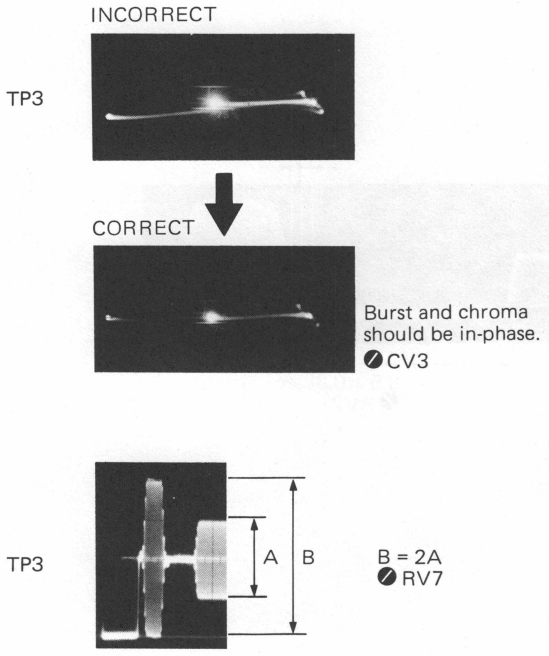
Adjustment MD Board



13-9. BURST LEVEL AND PHASE ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Vectorscope via Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

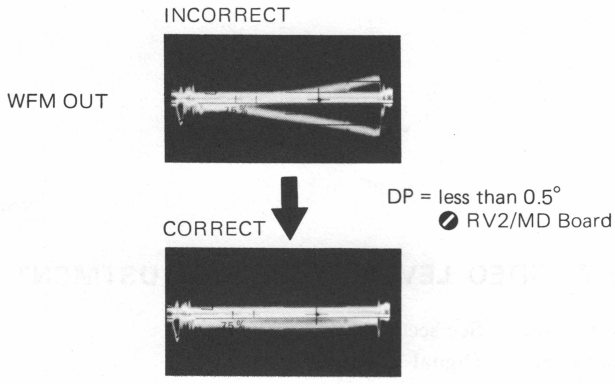
Adjustment MD Board



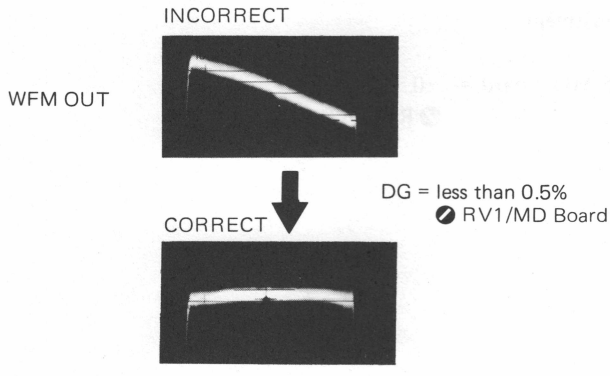
13-10. DG AND DP ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Vectorscope (DP or DG mode)
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1. DP Adjustment



Step 2. DG Adjustment

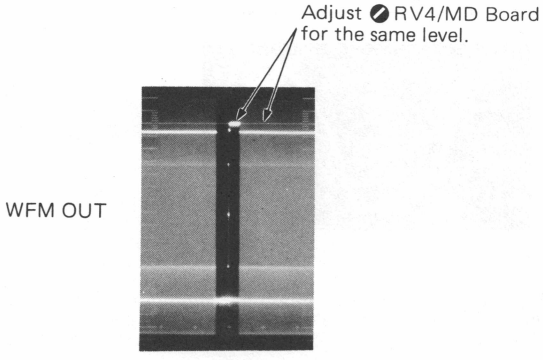


13-11. FM DEVIATION ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor (2-Field Mode)
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
WHITE REF Sw (SW1/DM-25): ON
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Set the WHITE REF switch (SW1/DM-25) to ON.

Step 2. Adjustment



Step 3.
After adjustment, set the WHITE REF switch (SW1/DM-25) to OFF.

13-12. MODULATOR FREQ. RESPONSE ADJUSTMENT

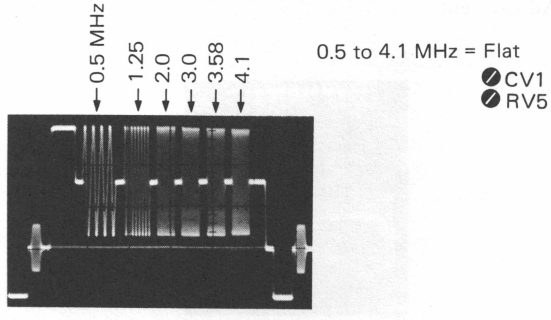
Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
MULTIBURST

MD Board

Step 1.
Set the JP1/JP2 jumper plug to JP2.

TP3: 0.5 to 4.1MHz = Flat
CV2

Step 2.
Set the JP1/JP2 jumper plug to JP1.



Step 3.
After adjustment, set the jumper plug to JP2.

13-13. VITC LEVEL AND TIMING ADJUSTMENT

This adjustment is necessary when the TC-14/TC-14A board (Time Code Reader/Generator) is installed.

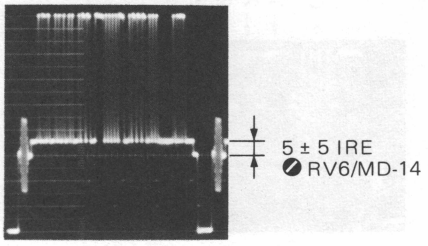
This section includes the two procedures, so that perform the adjustment in accordance with the board number.

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor (Line-14)
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
VITC ON/OFF Sw (S6/TC-14): ON
Input Signal (VIDEO IN);
Any Signal with Burst

PROCEDURE A:

For BVH-2000 (MD-14 Board No. 1-606-660-11 & 12)

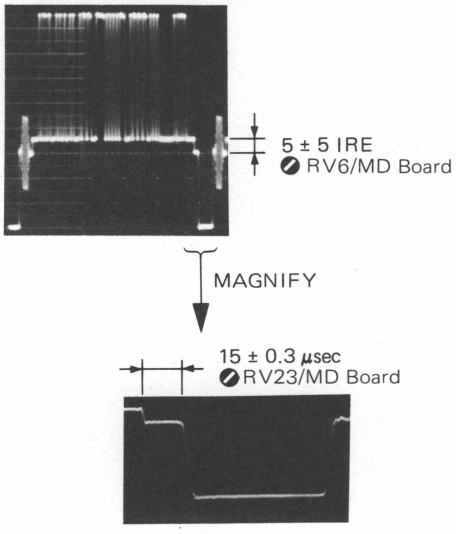
Adjustment



PROCEDURE B:

For BVH-2000 (MD-14 Board No. 1-606-660-13 & up)
For BVH-2500 (MD-22 Board No. 1-611-293-11 & up)

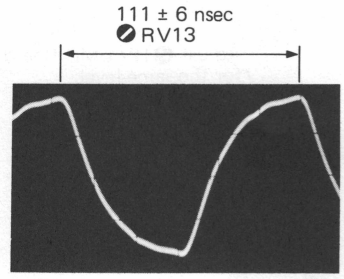
Adjustment



13-14. MODULATOR FREE RUN FREQ. AND BALANCE ADJUSTMENT

Connection; See section 8-4 connection 1, and disconnect the video input connector.
Equipment; Spectrum Analyzer via Oscilloscope
Mode of VTR; RECORD
Setting of Switches & Controls;
SERVO REF Sel: EXT
REC INHI Sw: OFF
Input Signal (VIDEO IN);
No Signal

Adjustment MD Board
Set the SERVO REF Selector to EXT position.



VIDEO CH: Spectrum Analyzer
TP6: Minimize 18 MHz Component.
RV9

SYNC CH : Spectrum Analyzer
TP9: Minimize 18 MHz Component.
RV17

13-15. VIDEO/RF LEVEL METER CALIBRATION

Connection; See section 8-4 connection 1.
Equipment; Unnecessary
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
METER Sw (S1/MD Board): INPUT
Input Signal (VIDEO IN);
RAMP LINEARITY

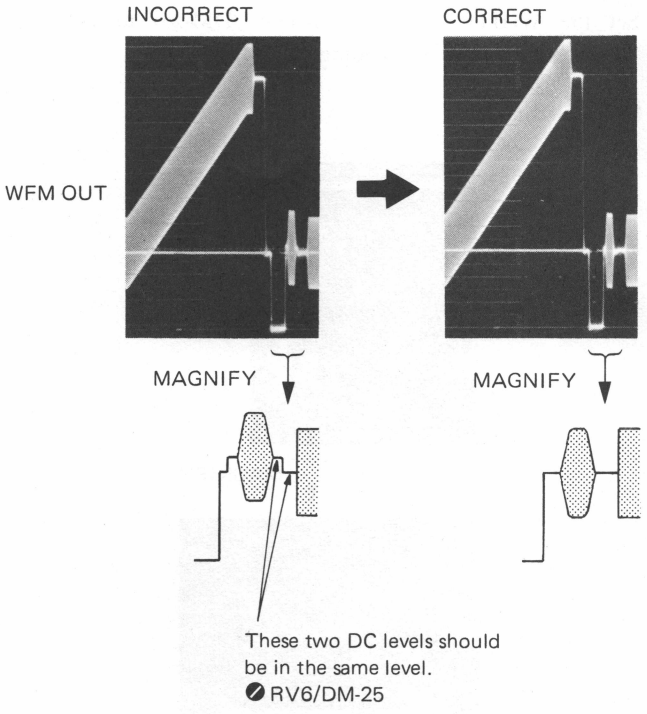
Adjustment

VIDEO/RF METER = 100%
RV15/MD Board

13-16. BURST DC LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor (2-Field Mode)
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



13-17. DEMOD AGC ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

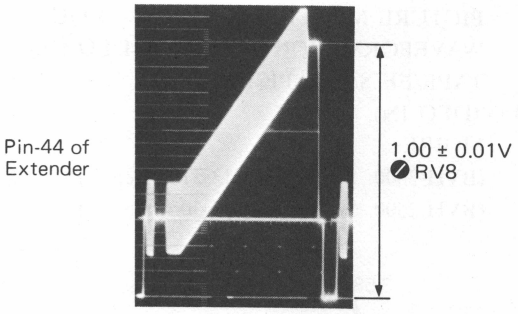
Adjustment DM-25 Board

TP5 = 0 ± 0.2Vdc
RV10

13-18. DEMOD OUTPUT LEVEL ADJUSTENT 1

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

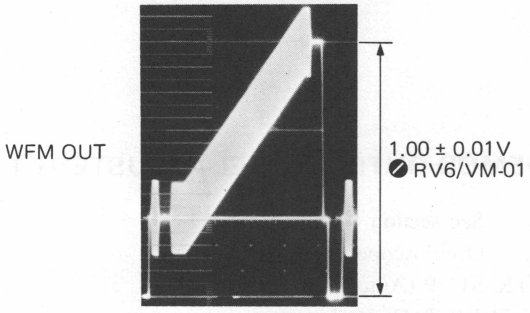
Adjustment DM-25 Board



13-19. DEMOD OUTPUT LEVEL ADJUSTMENT 2

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

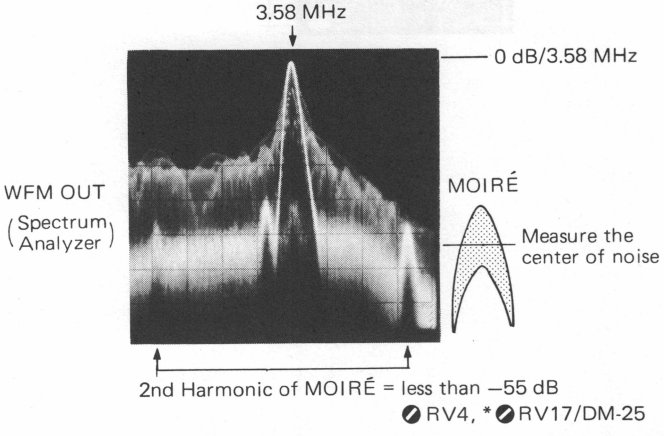
Adjustment



13-20. DEMOD BALANCE ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Spectrum Analyzer
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: VIDEO OUT
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
MOIRÉ
(BVH-2000; See section 13-31-4 step 1.)
(BVH-2500; See section 13-30-4 step 1.)

Adjustment



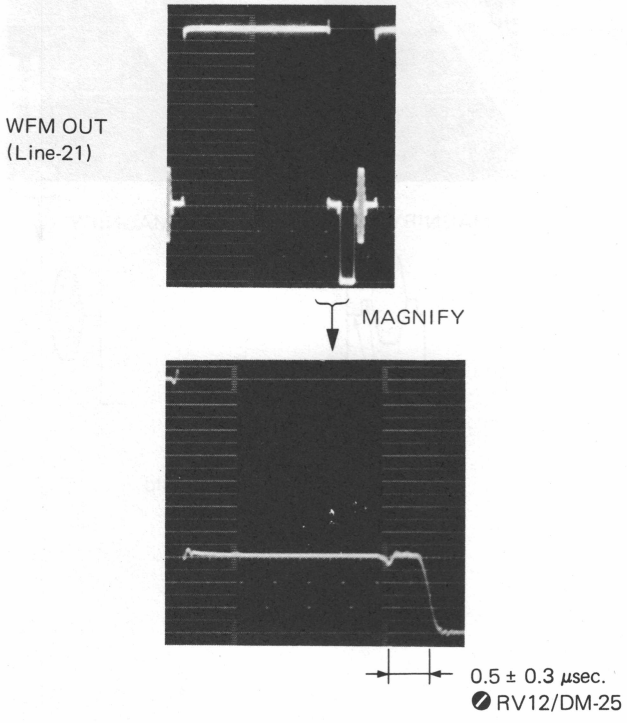
*; For the machine with following serial No., RV17 is mounted on the DM-25 board.
BVH-2000; # 22801 and up
BVH-2500; # 10401 and up

13-21. WHITE REFERENCE TIMING ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor (Line-21)
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
WHITE REF Sw (SW1/DM-25): ON
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Set the WHITE REF switch (SW1/DM-25) to ON and RV1/DM-25 to fully counterclockwise.

Step 2. Adjustment

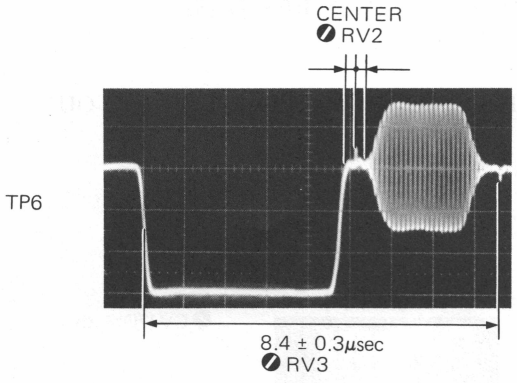


Step 3.
After adjustment, set the WHITE REF switch (SW1/DM-25) to OFF.

13-22. DEMOD BURST GATE TIMING ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DM-25 Board

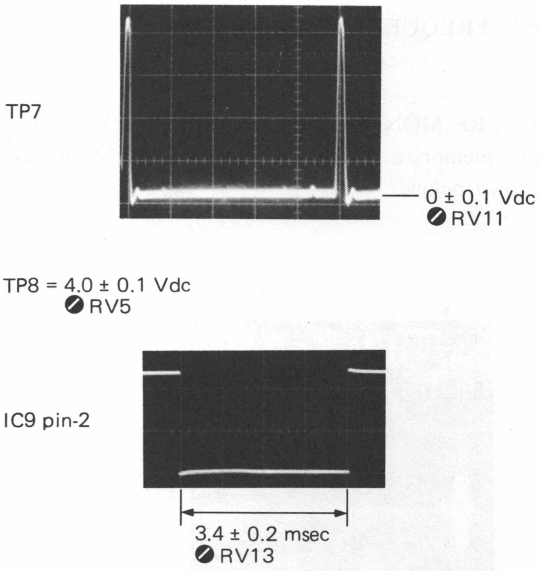


13-23. BURST LEVEL DETECTOR ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
BLACK BURST

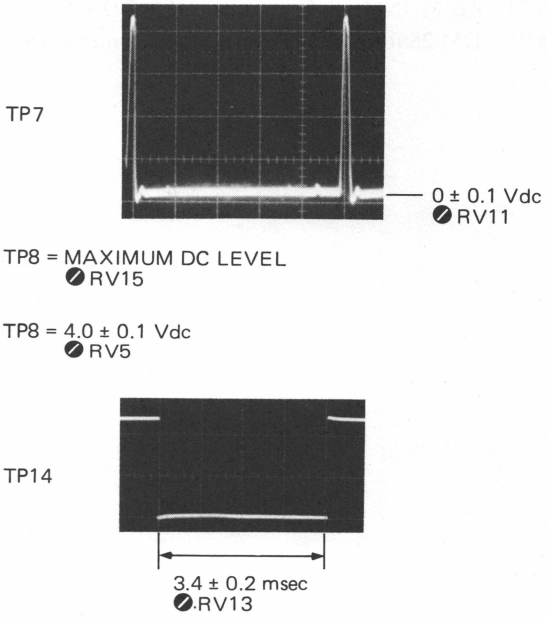
PROCEDURE A:

For DM-25 Board No. 1-606-661-11/12



PROCEDURE B:

For DM-25 Board No. 1-606-661-13 & up

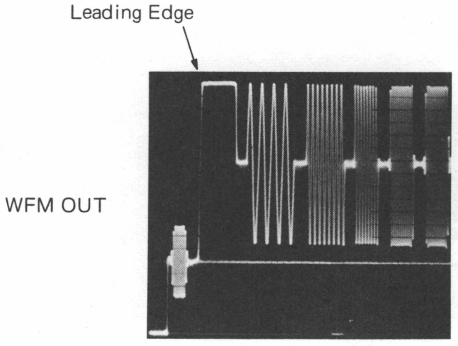


13-24. DEMOD FREQ. RESPONSE ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: INPUT VIDEO → DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
MULTIBURST

LOW BAND FREQUENCY RESPONSE

Step 1.
Set the PICTURE MONITOR Selector to INPUT VIDEO. Observe and memorize the leading edge of the Multiburst signal as shown below.

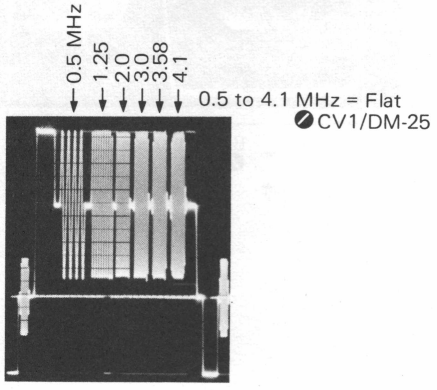


Step 2.
Set the PICTURE MONITOR Selector to DEMOD OUT. Adjust ◐RV7/DM-25 for the same wave shape as memorized in step 1.

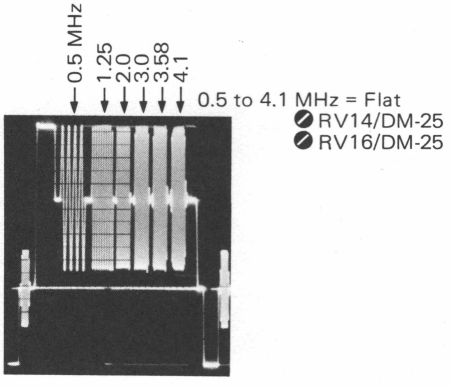
HIGH BAND FREQUENCY RESPONSE

Step 3.
Set the PICTURE MONITOR Selector to DEMOD OUT.

For DM-25 Board No. 1-606-661-11 & 12



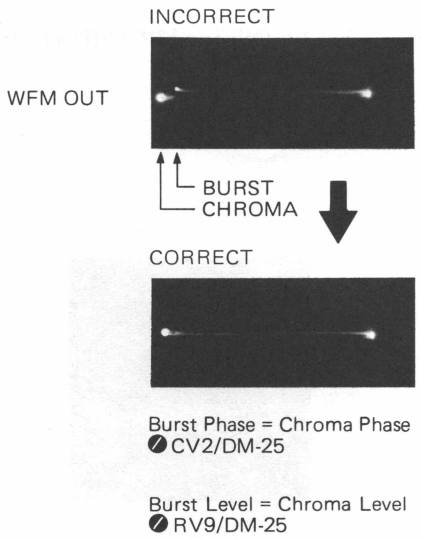
For DM-25 Board No. 1-606-661-13 & up



13-25. BURST PHASE AND LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Vectorscope (VECTOR Mode)
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment



Burst Phase = Chroma Phase
● CV2/DM-25

Burst Level = Chroma Level
● RV9/DM-25

13-26. RECORD AMPLIFIER PRESETTING

Do not turn the following potentiometers. If you should turn or make a replacement, set them as follows.

RP-09 Board

RV2 : Mid-rotation
RV4 : Mid-rotation
RV5 : Mid-rotation
RV6 : Fully Counterclockwise

RV5 and RV6 are used on the RP-09 board with Board No. 1-606-662-11 only.

13-27. ROTARY ERASE LEVEL AND FREQ. ADJUSTMENT

For Serial No. up to 10199

Connection; See section 8-4 connection 1.
Equipment; Frequency Counter via Oscilloscope
Mode of VTR; STOP (Auto E-E)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Short-circuit each of JP6 (VID REC OFF) and JP7 (VID TEST) on the LG-04 board.

Step 2. Adjustment RP-09 Board

VIDEO CHANNEL

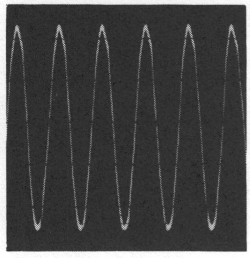
TP4 = 27 ± 0.5Vp-p
⊘RV1

TP4 = 17 ± 0.1 MHz
⊘LV1

SYNC CHANNEL

TP8 = 30 ± 0.5Vp-p
⊘RV3

TP8 = 17 ± 0.1 MHz
⊘LV2



Step 3.
Remove JP6 (VID REC OFF) and JP7 (VID TEST).

For Serial No. 10201 & up

Connection; See section 8-4 connection 1.
Equipment; Frequency Counter via Oscilloscope
Spectrum Analyzer via Oscilloscope
Mode of VTR; STOP
Setting of Switches & Controls;
TAPE/EE Sel: TAPE
R/P MODE Sel: CONFI HEAD
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Short-circuit each of JP6 (VID REC OFF) and JP7 (VID TEST) on the LG-04 board.

Step 2. Adjustment RP-09 board

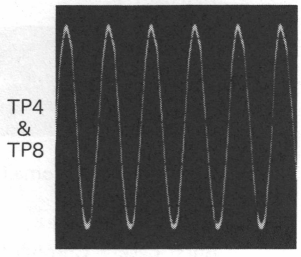
VIDEO CHANNEL

TP4 = 27 ± 0.5Vp-p
⊘RV1

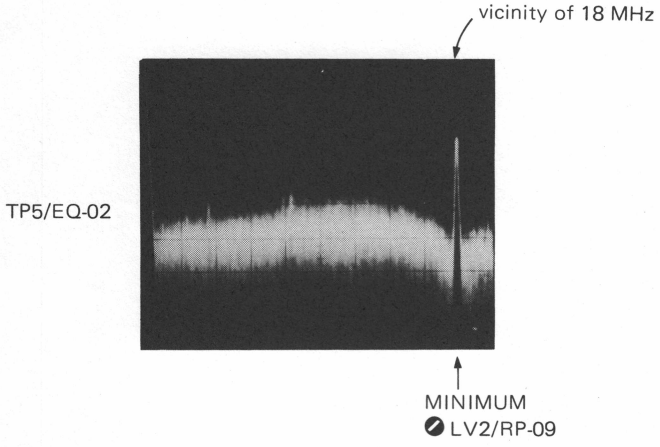
TP4 = 18 ± 0.1 MHz
⊘LV1

SYNC CHANNEL

TP8 = 30 ± 0.5Vp-p
⊘RV3



Step 3. Adjustment



Step 4.
Remove JP6 (VID REC OFF) and JP7 (VID TEST).

13-28. RECORD CURRENT AND PB RF LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Oscilloscope
Mode of VTR; REC → PLAY
Setting of Switches & Controls;
WAVEFORM MONITOR Sel: RF ENVELOPE
TAPE/EE Sel: TAPE
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Set the METER Selector (S1/MD-22) to RF(V) position.
Place the machine into the REC mode and adjust as follows.

VIDEO/RF Meter = Maximum Deflection
◐RV10/MD-22

Step 2.
With machine still in REC mode, set the METER Selector (S1/MD-22) to RF(S) position and adjust as follows.

VIDEO/RF Meter = Maximum Deflection
◐RV18/MD-22

Step 3.

Set the R/P MODE Selector to FIELD or FRM position.
Record the ramp linearity signal for several minutes.
Playback the recording and observe the RF envelope signal on the Waveform Monitor, and then adjust the levels as follows.

TP5/EQ-02 = 900 ± 40mVp-p
◐RV34/EQ-02

WFM OUT: R/P SYNC RF = R/P VIDEO RF
◐RV31/EQ-02

Step 4.
Set the R/P MODE Selector to CONFI HEAD position.
While playing back the portion recorded in step 3, adjust the level on the Waveform Monitor as follows.

WFM OUT: PLAY VIDEO RF = R/P VIDEO RF
◐RV32/EQ-02

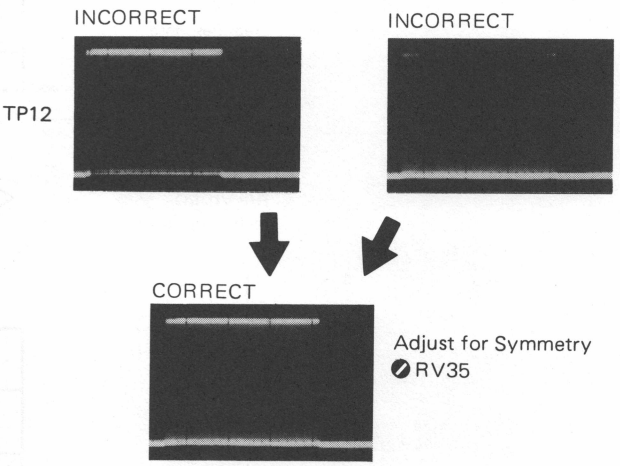
WFM OUT: PLAY SYNC RF = PLAY VIDEO RF
◐RV33/EQ-02

13-29. LIMITER BALANCE ADJUSTMENT*

For Serial No. up to 10199

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STANDBY (use Multiburst of Alignment Tape)
Setting of Switches & Controls;
TAPE/EE Sel: TAPE
REC INHI Sw: ON
PLAY MODE Sw (S3/LG-04): 1 HEAD
Input Signal (VIDEO IN);
Any Signal with Burst

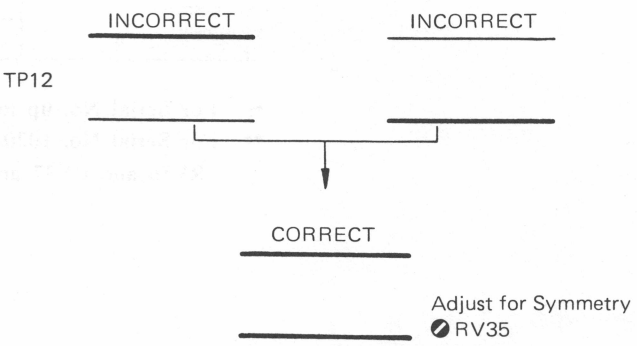
Adjustment EQ-02 Board



For Serial No. 10201 & up

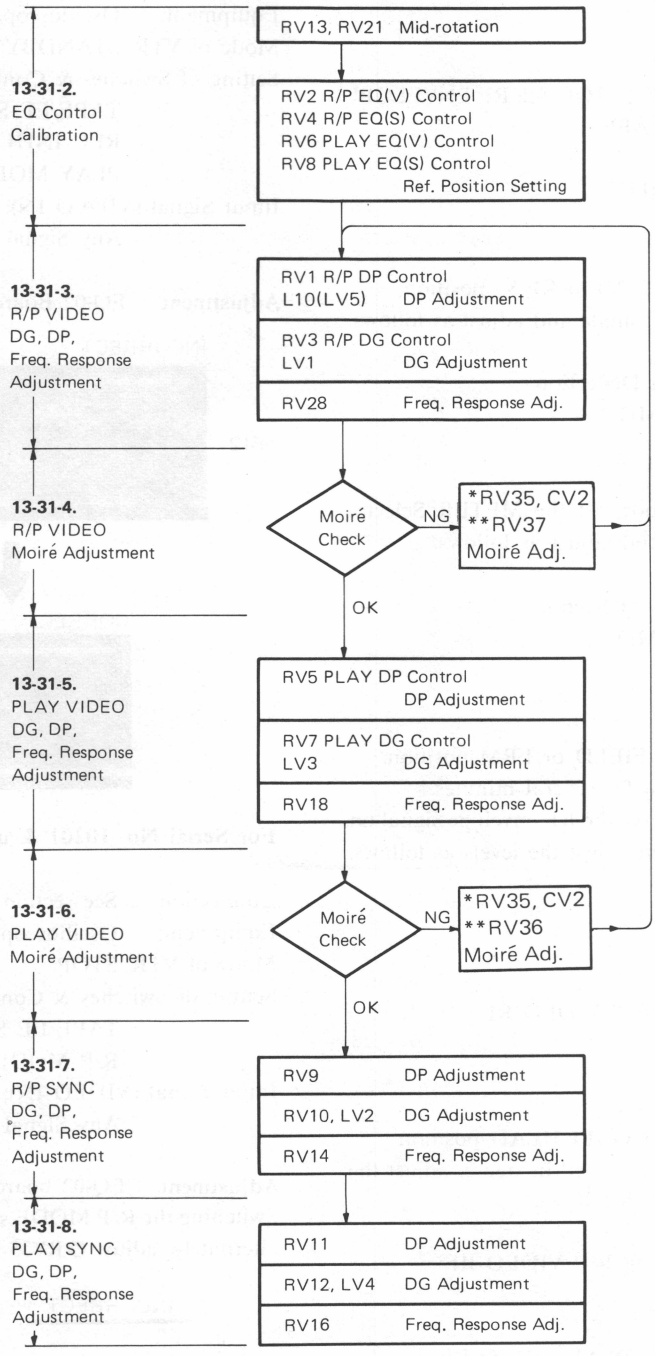
Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Setting of Switches & Controls;
TAPE/EE Sel: TAPE
R/P MODE Sel: FRM←→CONFI HEAD
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment EQ-02 board
Switching the R/P MODE selector to FRM and CONFI HEAD alternately, adjust ◐RV35 as follows.



13-30. PB FREQ. RESPONSE, DG AND DP ADJUSTMENT

13-30-1. EQ-02 Board Adjustment Flowchart



***; For Serial No. up to 10199**

****; For Serial No. 10201 & up**
(RV36 and RV37 are mounted on the DM-25 board.)

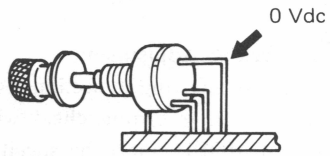
13-30-2. EQ Control Calibration

Connection; Don't care.
Equipment; Oscilloscope
Mode of VTR; STOP
Setting of Switches & Controls;
Don't care.

Step 1.
Set ● RV13/EQ-02 to mid-rotation.

Step 2.
Adjust the voltage at the center lead of following four EQ controls on the EQ-02 board for 0Vdc.

R/P EQ (V) Control (RV2/EQ-02)
R/P EQ (S) Control (RV4/EQ-02)
PLAY EQ (V) Control (RV6/EQ-02)
PLAY EQ (S) Control (RV8/EQ-02)



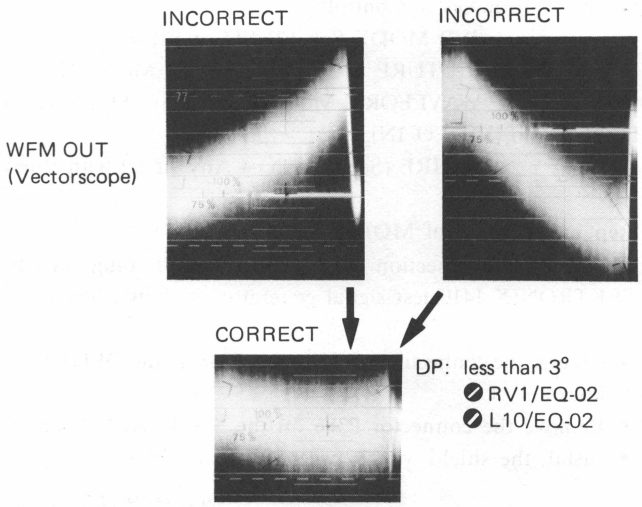
13-30-3. R/P VIDEO DG, DP and Freq. Response Adjustment

Connection; See section 8-4 connection 1.
Equipment; Vectorscope (Full Field)
Waveform Monitor
Mode of VTR; PLAY (Ramp Linearity and Multiburst of Alignment Tape)
Setting of Switches & Controls;
R/P MODE Sel: FIELD or FRM
PICTURE MONITOR Sel: TBC OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: ON
AUTO/MANU Sw (S1/EQ-02): MANU

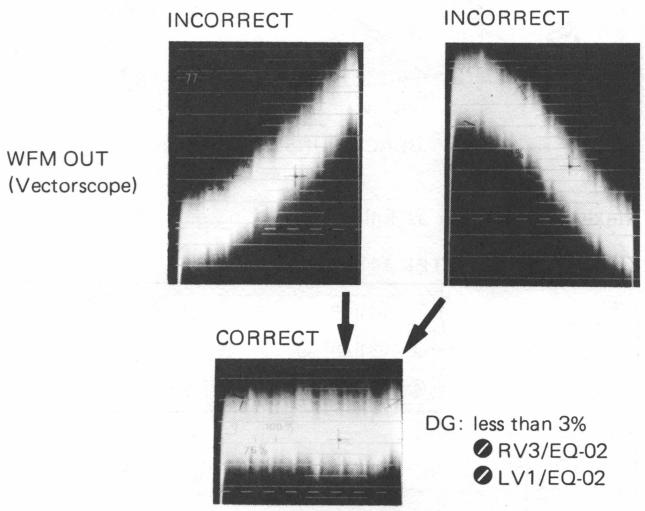
Step 1.
Set the R/P MODE Selector to FIELD or FRM position.

Step 2. Adjustment

DP Adjustment (Play back of Ramp Linearity)



DG Adjustment (Playback of Ramp Linearity)



Freq. Response Adjustment (Playback of Multiburst)
WFM: Freq. Resp. = Flat
● RV28/EQ-02

After the adjustment, repeat from the DP adjustment until satisfy the specifications.

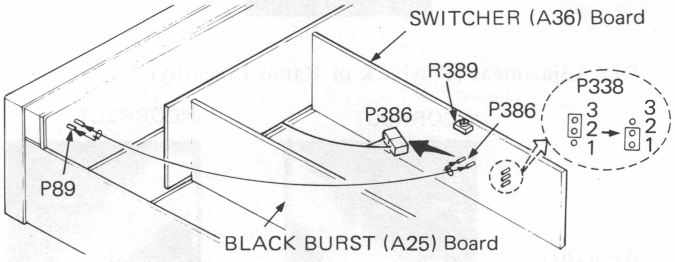
Specifications
DG; less than 3%
DP; less than 3°
FREQ. RESP.; Flat (±3%: reference to 0.5MHz)

13-30-4. R/P VIDEO MOIRÉ Adjustment

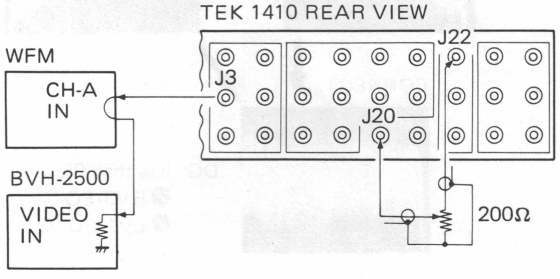
Connection; See section 8-4 connection 1, excluding step 1.
Equipment; Waveform Monitor
Spectrum Analyzer.
Mode of VTR; REC → PLAY
Setting of Switches & Controls
R/P MODE Sel: FIELD or FRM
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
Input Signal (VIDEO IN);
MOIRÉ (See step 1) → Any signal with Burst

Step 1. Recording of MOIRÉ signal.
Change the connection of connector and plug in the TEKTRONIX 1410 test signal generator as shown below.

- Change the connection of short plug P338 on the SWITCHER board.
- Remove the connector P386 on the SWITCHER board.
- Install the shield wire between P386 and P89.

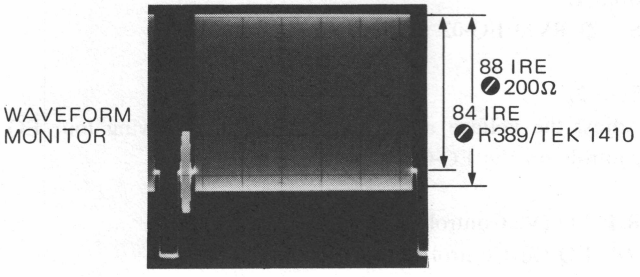


Make a connection as follows.



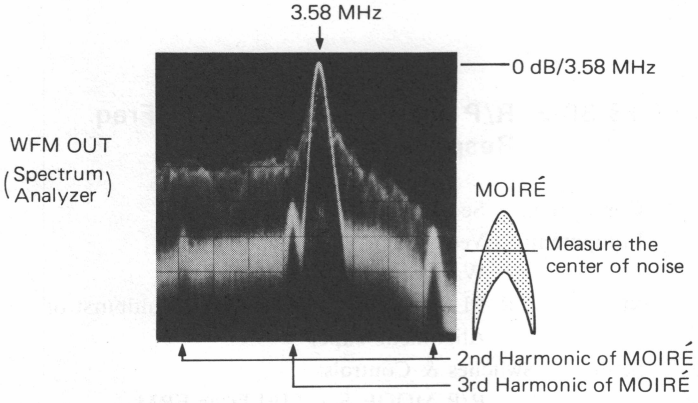
Select the signal selector on the TSP1 to "BLACK BURST" and observe the waveform monitor.

Adjust R389 on the SWITCHER board (TEK 1410/TSP1) and 200Ω potentiometer until obtaining the proper MOIRÉ signal as shown below.



Record the MOIRÉ Signal for several minutes.

Step 2. MOIRÉ Check & Adjustment
Connect the equipments referring to section 8-4 connection 1 and while playing back the recording, check whether the 2nd and 3rd harmonics of MOIRÉ meet the specifications.
If not, perform the MOIRÉ adjustment and repeat the adjustment from section 13-30-3.



Specifications
2nd Harmonic of MOIRÉ = less than −48dB
RV35 (For Serial No. up to 10199)/EQ-02
RV37 (For Serial No. 10201 & up)/DM-25
3rd Harmonic of MOIRÉ = less than −43dB
CV2/EQ-02

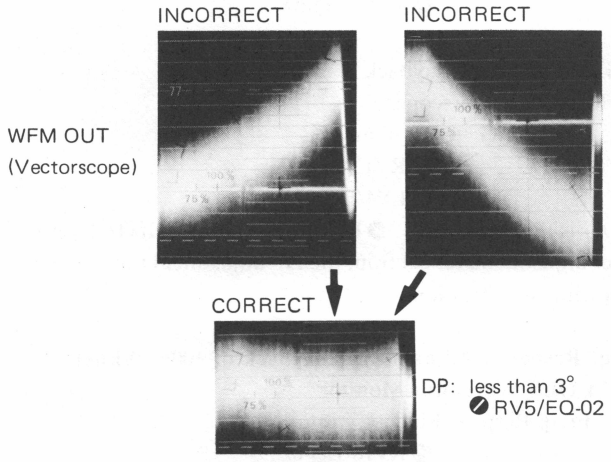
13-30-5. PLAY VIDEO DG, DP and Freq. Response Adjustment

Connection; See section 8-4 connection 1.
Equipment; Vectorscope
Waveform Monitor
Mode of VTR; PLAY (Ramp Linearity and Multiburst of Alignment Tape)
Setting of Switches & Controls;
R/P MODE Sel: CONFI HEAD
TAPE/EE Sel: TAPE/EE
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: ON
AUTO/MANU Sw (S1/EQ-02): MANU

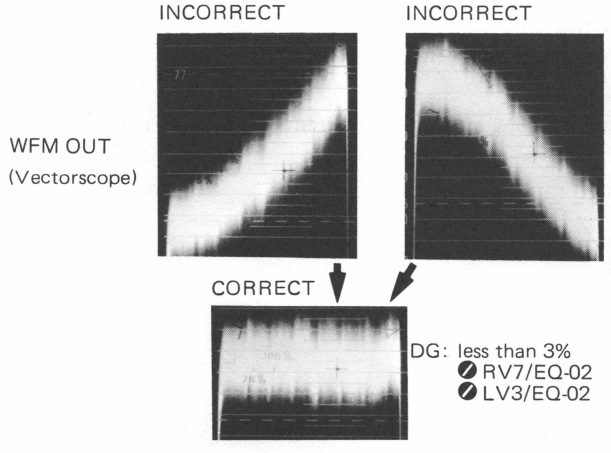
Step 1.
Set the R/P MODE Selector to CONFI HEAD position.

Step 2. Adjustment

DP Adjustment (Playback of Ramp Linearity)



DG Adjustment (Playback of Ramp Linearity)



Freq. Response Adjustment (Playback of Multiburst)
WFM: Freq. Resp. = Flat
RV18/EQ-02
After the adjustment,repeat from the DP adjustment until meet the specifications.

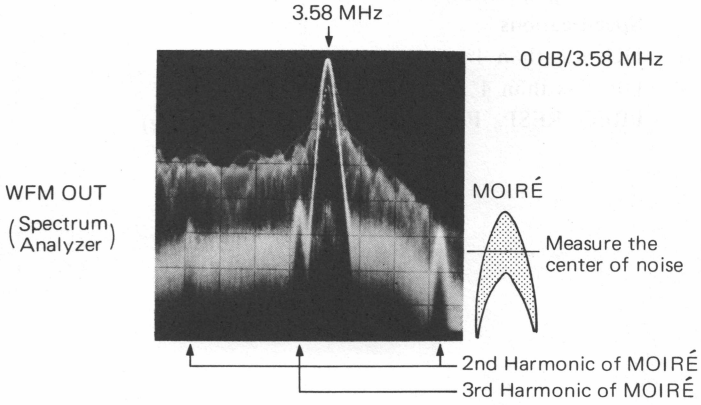
Specifications
DG; less than 3%
DP; less than 3°
FREQ. RESP.; Flat (±3%: reference to 0.5MHz)

13-30-6. PLAY VIDEO MOIRÉ Adjustment

Connection; See section 8-4 connection 1, excluding step 1.
Equipment; Waveform Monitor
Spectrum Analyzer
Mode of VTR; REC → PLAY
Setting of Switches & Controls;
R/P MODE Sel: CONFI HEAD
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel: SELECT VIDEO
Input signal (VIDEO IN);
MOIRÉ (See step 1.) → Any signal with Burst

Step 1. Recording of MOIRÉ signal
Refer to section 13-30-4 step 1.

Step 2. MOIRÉ Check & Adjustment
Connect the equipments referring to section 8-4 connection 1 and while playing back the recording, check whether the 2nd and 3rd harmonics of MOIRÉ meet the specifications.
If not, perform the MOIRÉ adjustment and repeat the adjustment from section 13-30-3.



Specifications
2nd Harmonic of MOIRÉ = less than −48dB
RV35 (For Serial No. up to 10199)/EQ-02
RV36 (For Serial No. 10201 & up)/DM-25
3rd Harmonic of MOIRÉ = less than −43dB
CV2/EQ-02

13-30-7. R/P SYNC DG, DP and Freq. Response Adjustment

Connection; See section 8-4 connection 1.
Equipment; Vectorscope
Waveform Monitor (Line-14)
Mode of VTR; PLAY (100% White of Alignment Tape)
Setting of Switches & Control;
R/P MODE Sel: FIELD or FRM
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: ON
AUTO/MANU Sw (S1/EQ-02): MANU

Step 1.
Set the R/P MODE selector to FIELD or FRM position.

Step 2. Adjustment

DP Adjustment (Playback of 100% White)
WFM OUT:Vectorscope
DP = less than 4°
● RV9/EQ-02

DG Adjustment (Playback of 100% White)
WFM OUT:Vectorscope
DG = less than 4%
● RV10/EQ-02
● LV2/EQ-02

Freq. Resp. Adjustment (Playback of 100% White)
WFM OUT:Waveform Monitor
Freq. Resp. = Flat
● RV14/EQ-02
After adjustment, repeat from the DP adjustment until meet the following specifications.
Specifications
DG; less than 4%
DP; less than 4°
FREQ. RESP.; Flat (±5%: reference to 0.5MHz)

13-30-8. PLAY SYNC DG, DP and Freq. Response Adjustment

Connection; See section 8-4 connection 1.
Equipment; Vectorscope
Waveform Monitor (Line-14)
Mode of VTR; PLAY (100% White of Alignment Tape)
Setting of Switches & Controls;
R/P MODE Sel: CONFI HEAD
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: ON
AUTO/MANU Sw (S1/EQ-02): MANU

Step 1.
Set the R/P MODE Selector to CONFI HEAD position.

Step 2. Adjustment

DP Adjustment (Playback of 100% White)
WFM OUT:Vectorscope
DP = less than 4°
● RV11/EQ-02

DG Adjustment (Playback of 100% White)
WFM OUT:Vectorscope
DG = less than 4%
● RV12/EQ-02
● LV4/EQ-02
If DG is not linear, turn ● LV4/EQ-02 about half (1/2) toward
After adjustment, repeat from the DP adjustment until meet the following specifications.

Freq. Response Adjustment (Playback of 100% White)
WFM OUT:Waveform Monitor
Freq. Resp. = Flat
● RV16/EQ-02

After adjustment, repeat from the DP adjustment until meet the following specifications.
Specifications
DG; less than 4%
DP; less than 4°
FREQ. RESP.; Flat (±5%: reference to 0.5MHz)

13-31. VIDEO/SYNC RECORD SYSTEM ADJUSTMENT

13-31-1. Video Channel Freq. Response, DG and DP Adjustment

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor (Line-21)
Vectorscope
Mode of VTR; REC
Setting of Switches & Controls;
TAPE/EE Sel: TAPE
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: OFF
METER Sel (S1/MD-22): RF(V)
Input Signal (VIDEO IN);
RAMP LINEARITY
(VITS: MULTIBURST)

Adjustment
Set the TAPE/EE Selector to TAPE and METER Selector (S1/MD-22) to RF (V) positions.
Place the machine into the REC mode and adjust as follows.

VIDEO/RF Meter = Maximum Deflection
● REC CUR (V) Control (RV10/MD-22)

WFM OUT:Vectorscope
DP = less than 3°
DG = less than 3%
● RV11/MD-22

WFM OUT:Waveform Monitor (Line-21)
Freq. Resp. = Flat
● RV12/MD-22

Repeat the adjustment several times until meet the specifications.

13-31-2. Sync Channel Freq. Response, DG and DP Adjustment

Connection; See section 8-4 connection 2.
Equipment; Waveform Monitor (Line-14)
Vectorscope (VITS FIELD, Line-13)
Mode of VTR; REC
Setting of Switches & Controls;
TAPE/EE Sel: TAPE
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: OFF
METER Sel (S1/MD-22): RF (S)
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Insert the Ramp Linearity (VITS) in line 13 and Multiburst (VITS) in line 14 of TEK 149A.

Step 2. Adjustment
Set the TAPE/EE Selector to TAPE and METER Selector (S1/MD-22) to RF (S) position.
Place the machine into the REC mode and adjust as follows.

VIDEO/RF Meter = Maximum Deflection
● REC CUR (S) Control (RV18/MD-22)

WFM OUT:Vectorscope
DP = less than 4°
DG = less than 4%
● RV19/MD-22

WFM OUT:Waveform Monitor (Line-14)
Freq. Resp. = Flat
● RV20/MD-22

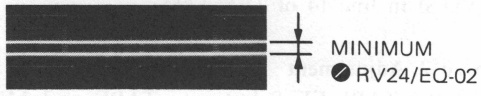
Repeat the adjustment several times until meet the specifications.

13-32. DROPOUT DETECTOR SENSITIVITY ADJUSTMENT

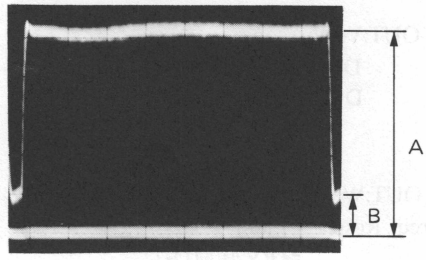
Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Oscilloscope
Mode of VTR; STOP → REC → PLAY
Setting of Switches & Controls;
WAVEFORM MONITOR Sel: RF ENVELOPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
AUTO/MANU Sw (S1/EQ-02): MANU
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Unplug the jumper plug JP3 on the EQ-02 board.

Step 2.
Set the machine into the STOP mode and adjust as follows.



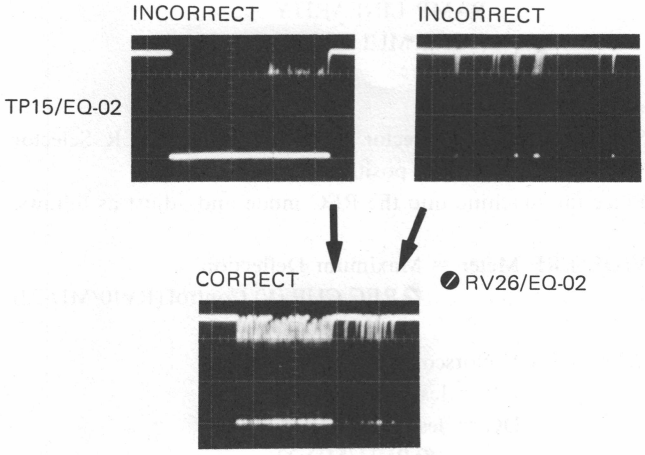
Step 3.
Record and play back a color bars signal and set the SYNC level as follows.



$$\frac{\text{A (VIDEO)}}{\text{B (SYNC)}} = 5$$

RV31/EQ-02

Step 4. Adjustment



After the adjustment, set RV31/EQ-02 to obtain the SYNC level equal to VIDEO level.

Step 5.
Plug the jumper plug JP3 on the EQ-02 board.

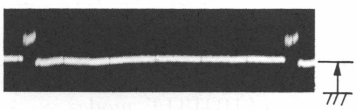
13-33. RF LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor (Ext Sync, 2-Field Mode)
Oscilloscope
Mode of VTR; REC → PLAY
Setting of Switches & Controls;
DO SIG OUTPUT: Terminate with 75-ohm
WAVEFORM MONITOR Sel: RF ENVELOPE
R/P MODE Sel: FIELD or FRM
→ CONFI HEAD
REC INHI Sw: OFF
AUTO/MANU Sw (S1/EQ-02): MANU
Input Signal (VIDEO IN);
50% FLAT FIELD

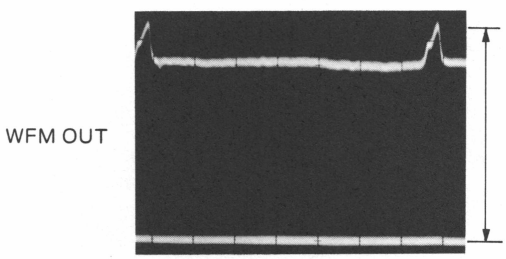
Step 1.
Record and play back a 50% Flat Field signal.

Step 2.

TP5/EQ-02 = 900 ± 40mVp-p ⊘ RV34/EQ-02



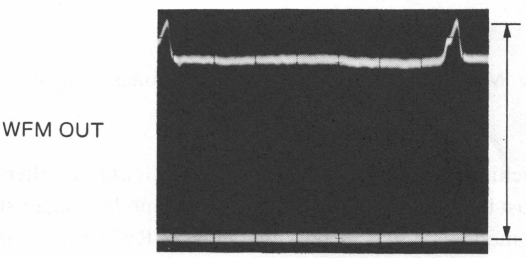
Step 3.
Set the R/P MODE selector to FIELD or FRM position.



VIDEO CH = 0.35 ± 0.05 Vp-p
⊘ RV25/EQ-02

SYNC CH = 0.35 ± 0.05 Vp-p
⊘ RV31/EQ-02

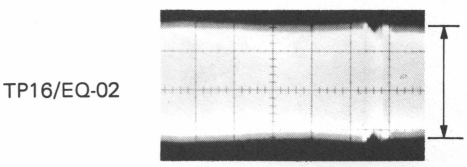
Step 4.
Set the R/P MODE selector to CONFI HEAD position.



VIDEO CH = 0.35 ± 0.05 Vp-p
⊘ RV32/EQ-02

SYNC CH = 0.35 ± 0.05 Vp-p
⊘ RV33/EQ-02

Step 5.
Set the jumper plug JP2/JP1 (TTL/RF) on the EQ-02 board to JP1 (RF).



Step 6.
Set the jumper plug JP2/JP1 to JP2 (TTL).

13-34. AUTO CHROMA LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Waveform Monitor
Mode of VTR; REC → PLAY
Setting of Switches & Controls;
R/P MODE Sel: FIELD or FRM
TAPE/EE Sel: TAPE/EE
PICTURE MONITOR Sel: TBC
WAVEFORM MONITOR Sel: SELECT VIDEO
REC INHI Sw: OFF
Input Signal (VIDEO IN);
MULTIBURST

Step 1.
Make sure the position of R/P EQ (V) Control (RV2/EQ-02) as follows.

Center Lead = 0Vdc
(Refer to section 13-30-2)

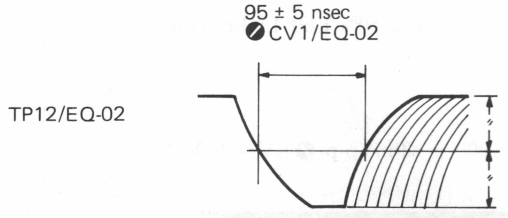
Step 2.
Record the Multiburst and while playing it back, adjust as follows.

While switching the AUTO/MANU switch (S1/EQ-02) alternately, adjust the frequency response in AUTO mode as against in MANU mode as equal as possible with ◐ RV27/EQ-02 at the WFM OUT.

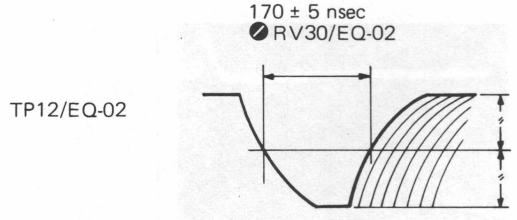
13-35. DROPOUT DETECTOR ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope (Trig. Slope −)
Mode of VTR; REC → PLAY (x1) → SHUTTLE
Setting of Switches & Controls;
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
AUTO/MANU Sw (S1/EQ-02): AUTO
PLAY MODE Sw (S3/LG-04): 1-HEAD
Input Signal (VIDEO IN);
COLOR BARS

Step 1.
Record a color bars signal and while playing it back, adjust as follows.



Step 2.
Place the machine into SHUTTLE mode.
Turn the SEARCH dial toward counterclockwise gradually and stop where the voltage at pin-29AB/EQ-02 reaches +8Vdc, then adjust as follows.



13-36. VIDEO/RF METER CALIBRATION

Connection; See section 8-4 connection 1.
Mode of VTR; STOP → REC → PLAY
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
AUTO/MANU Sw (S1/EQ-02): AUTO
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Place the machine into the STOP (Auto EE) mode, and set the METER Selector (S1/MD-22) to INPUT position, then adjust as follows.

VIDEO/RF METER = 100%
● RV15/MD-22

Step 2.
Set the METER Selector (S1/MD-22) to RF(V) position.
Record a Ramp Linearity signal and while playing it back, adjust as follows.

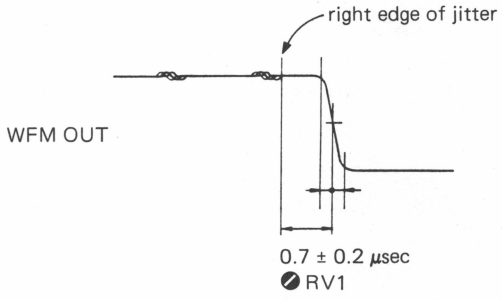
VIDEO/RF METER = 100%
● RV14/MD-22

13-37. 1.5 HEAD RF SWITCHING PULSE TIMING ADJUSTMENT

Connection; See Section 8-4 connection 1.
Equipment; Waveform Monitor (Line-16)
Mode of VTR; REC → PLAY
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
PICTURE MONITOR Sel:
DEMOD OUT
WAVEFORM MONITOR Sel:
SELECT VIDEO
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment LG-04 Board

Playback the recording, and measure the LINE-16 waveform.

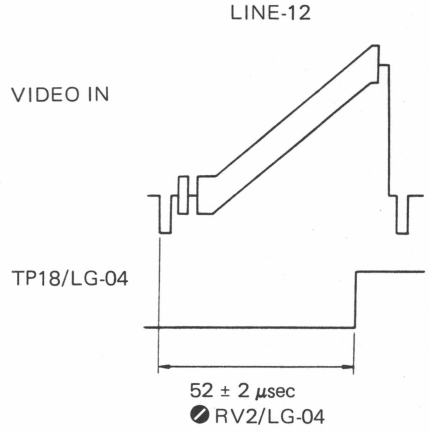


13-38. Δt ERASE VIDEO SWITCHING PULSE TIMING ADJUSTMENT

Connection; See Section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; STANDBY ON
Setting of Switches & Controls;
ADV Sw (S1/CD-17): OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Applicable Serial No.; # 10001 to 10099

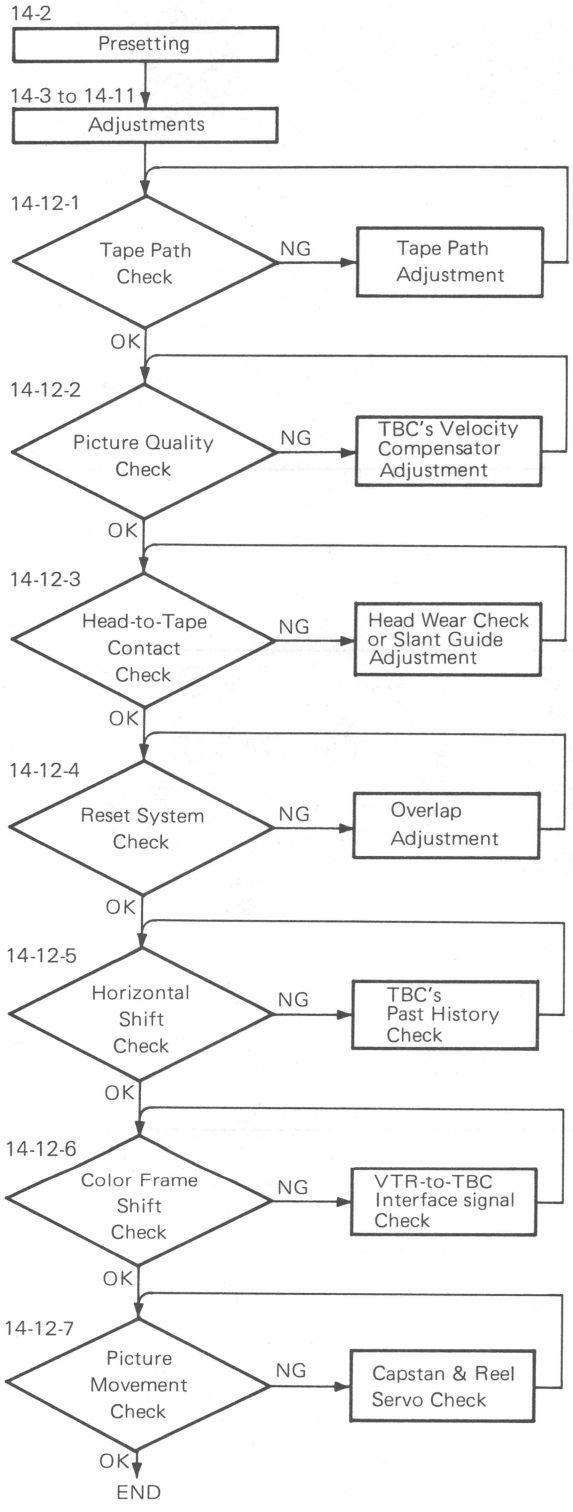
Adjustment



SECTION 14
DT SYSTEM ALIGNMENT

14-1. ALIGNMENT FLOWCHART

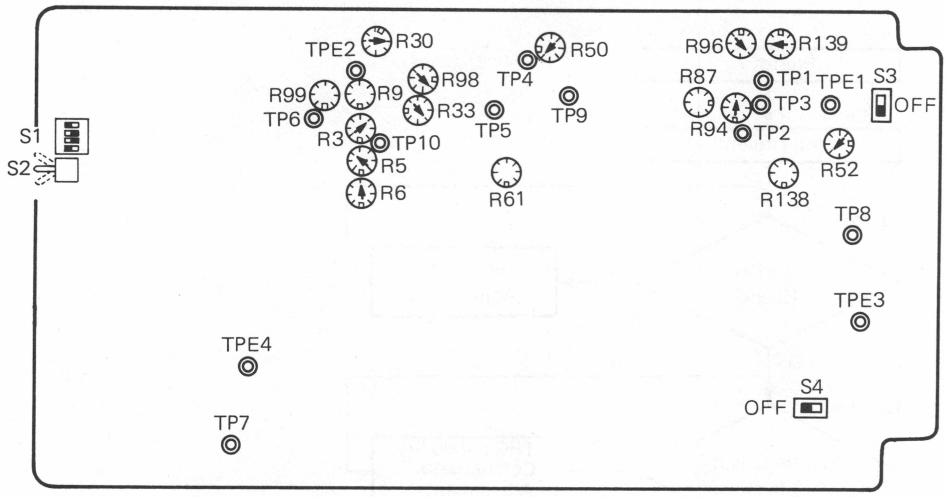
The DT system operates with various closed loops and it necessitates for the all systems to be operating correctly. In particular, it relates to the tape path, drum servo, capstan servo, reel servo, system control and video signal systems.



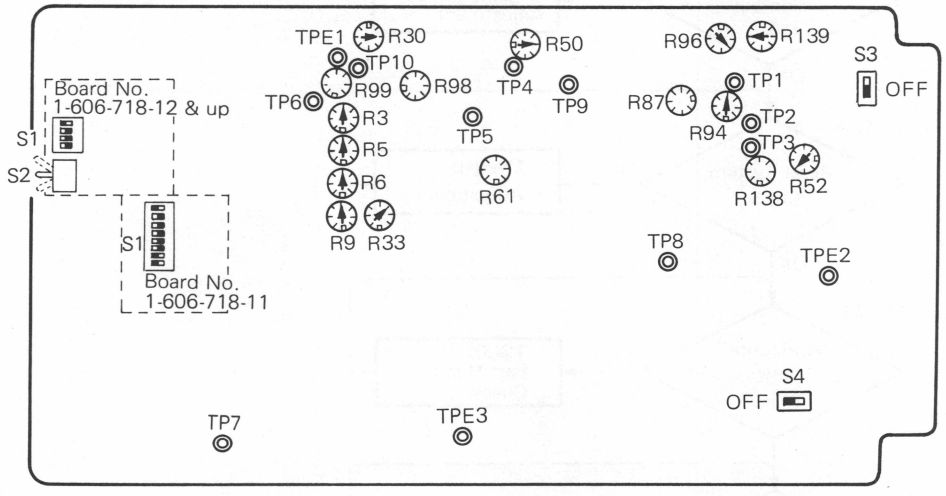
14-2. POTS AND SWITCHES PRESETTING

Note: R98 and R99 adjustment need not be performed.

DT-04 Board



DT-05 Board



14-3. +12V ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Switch & Control Settings;
R/P MODE Sel: FIELD or FRM
Input Signal (VIDEO IN);
Don't care.

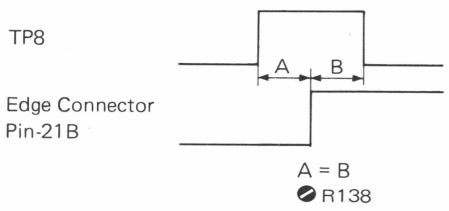
Adjustment DD-01 Board

IC1 pin-3 = 12 ± 0.01 Vdc
⊘RV1

14-4. PB V DETECTOR ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope (Trig. TP8: DT Board)
Mode of VTR; STOP (Auto E-E)
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
Input Signal (VIDEO IN);
Any Signal with Burst

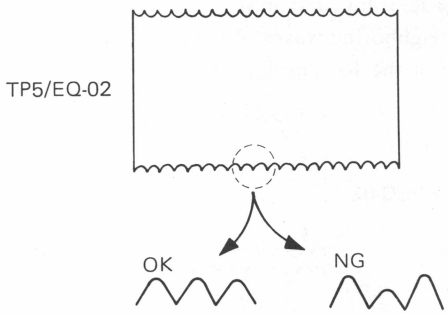
Adjustment DT Board



14-5. RF BALANCE ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment
Playback the recording.

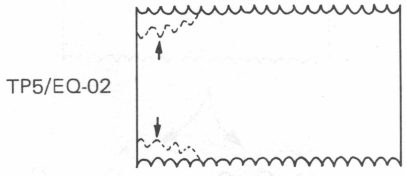


Adjust ⊘ R87 and ⊘ R61(DT Board) for symmetry and discrepancy in size between neighboring waves of the folded-up since waves.

14-6. DT DRIVE AND JUMP SIGNAL D/A LEVELS ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → VAR Still → −1 → +2 → +3
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Playback the recording and place machine in VAR Still mode. Adjust ◐ R33 for maximum and no discrepancy in size between neighboring waves of the folded-up sine waves at the beginning of the RF envelope as shown.



Step 2.
Adjust ◐ R3 in similar manner to step 1 with VAR −1 mode.

Step 3.
Adjust ◐ R5 in similar manner to step 1 with VAR +2 mode.

Step 4.
Adjust ◐ R6 in similar manner to step 1 with VAR +3 mode.

Step 5.
Note: Normally, there is not much necessity to perform step 5.
Observe the PB CTL signal at pin-15A of the edge connector on the CD-17 board. With JOG mode, turn the search dial toward counterclockwise until the PB CTL pulse width reaches −5% (−1.05 times normal) as against the −1 time normal speed and in this instant set the REMOTE/LOCAL switch to REMOTE position, so that the speed can be maintained.

Adjust ◐ R9 in similar manner to step 1 with −1.05 JOG mode.

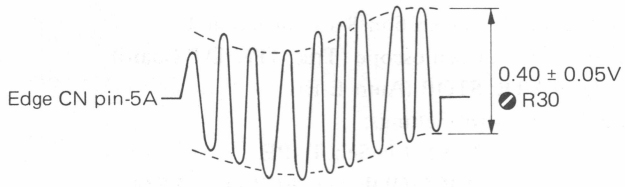
14-7. WOBBLING AND DT DRIVE LEVELS ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → PLAY
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. DT-04 Board
Playback the recording and check the average driving level as follows.

If the measured level against the specified value is abnormal, replace the upper drum assembly.

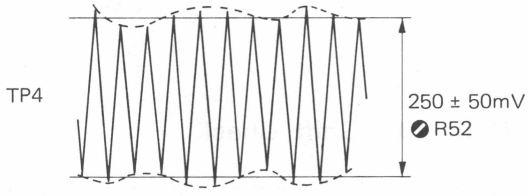
Step 2. Wobbling Level Adjustment DT Board
With machine still in play mode, check and/or adjust as follows.



14-8. RF ENVELOPE LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → VAR +1
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
Input Signal (VIDEO IN);
Any Signal with Burst

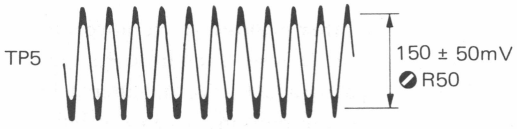
Adjustment DT Board
Playback the recording and place machine in VAR +1 mode.



14-9. STRAIN GAUGE LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → STILL
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DT Board
Playback the recording and place machine in still mode.

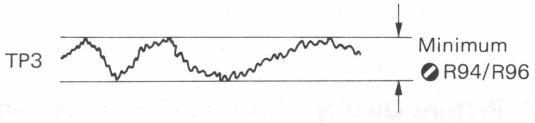


14-10. FEED-BACK LOOP ADJUSTMENT

Note: Normally, it is sufficient for R94 and R96 to be left at the preset position as shown in section 14-2.

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → VAR +1/30 (NTSC)
VAR +1/25 (PAL)
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
REC INHI Sw: OFF
Input Signal (VIDEO IN);
Any Signal with Burst

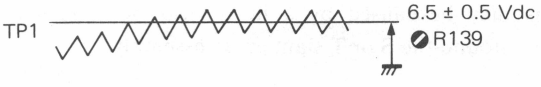
Adjustment DT Board
Playback the recording and place machine in VAR +1/30 for NTSC or in VAR +1/25 for PAL.



14-11. WOBBLING LEVEL ADJUSTMENT

Connection; See section 8-4 connection 1.
Equipment; Oscilloscope
Mode of VTR; PLAY
Switch & Control Settings;
TAPE/EE Sel: TAPE
R/P MODE Sel: FIELD or FRM
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DT Board



14-12. CONFIRMATION AFTER ADJUSTMENT

Make a connection of the test equipments referring to section 8-4 connection 1.

14-12-1. Tape Path Check in Reverse Direction

Record a color bar signal a few minutes. Place machine in JOG mode and move at the beginning of the recorded portion slightly in the forward direction and stop the tape.
Set the VAR preset speed to about −6/30 (−5/25 for PAL/SECAM) with Program Jog mode.
Check that the waveforms at the beginning of the RF envelope do not change for about 5 seconds after the VAR button has been pressed and immediately after the tape has started to move in the reverse direction.
If the waveforms change about 10%, the problem may be caused by a defective S or T slant guide assembly which necessitates the tape path adjustment.

14-12-2. Picture Quality Check in Normal Speed

Play back the color bar recorded portion and while switching the tape speed with VAR +3, +2, +1, +1/5, 0, −1/5 and −1 speeds, check that the hue and brightness irregularity, white or black stripes and dropouts do not result.
Take special care at the top and bottom of the picture and a problem may be caused by insufficient velocity compensator adjustment of the TBC.

14-12-3. Head-to-Tape Contact Check at the Mode Transition

Check that the there is nothing wrong with the RF envelope and picture when the machine is in transit between the reverse/STILL/+1 speed/+3 speed modes.
Also check that there are no omissions at the top of the picture during manual JOG mode.
Omissions may be caused by a head wear or a defective adjustment around the S or T slant guide assembly.

14-12-4. Reset System Check with Excessive Speeds

With manual JOG mode, rotate the reel by hand, increase the speed to more than −1 in order to disturb the DT operation, release hand immediately so as to set machine in still mode and then check that the proper DT playback picture should appear at the time.
If the DT operation cannot be returned properly, the problem may be caused by the insufficient overlap of the video track.

14-12-5. Horizontal Shift Check

While playing back the color bar with −1 through +3 speeds, check the picture on the monitor does not shift 140 nsec or 280 nsec (113 nsec or 226 nsec for PAL/SECAM) horizontally.
If there is any shift, check the SKEW amount and interface signals between the VTR and TBC or past history (Refer to sec. 2-10 "BVT-2000 Modification".) of the TBC used.

14-12-6. Color Frame Shift Check

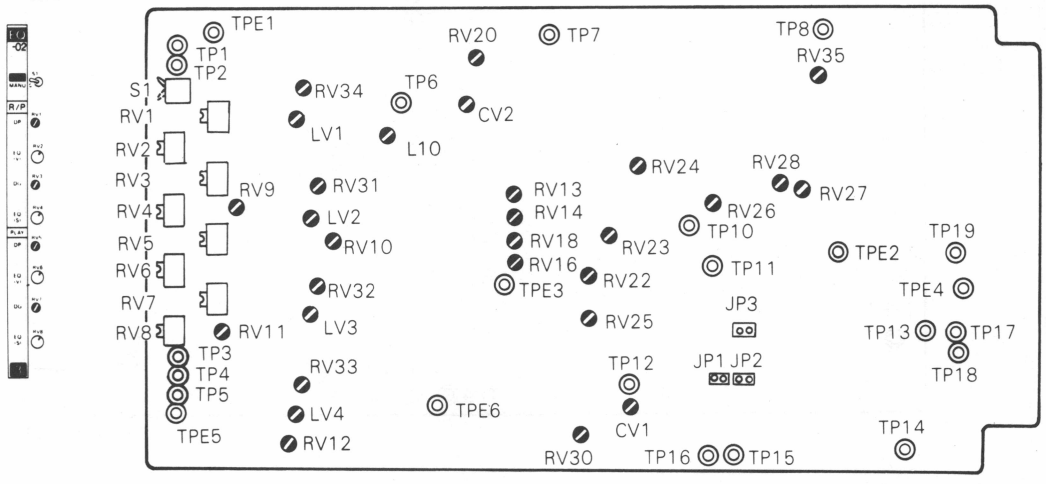
Feed an any signal with stable horizontal sync/subcarrier and make a recording. Check that the color framing is locked with the SC PHASE meter on the SR-15 board.
Play back the recording with normal speed and adjust the CF pot on the BVT-2000's SQ board.
Check that the picture does not shift up and down or left and right when the VTR is changed in PLAY → STILL ↔ PLAY modes. This kind of symptom may occur when the early BVT-2000 is used. Check the interface signals between the VTR and TBC.

14-12-7. Picture Movement Check

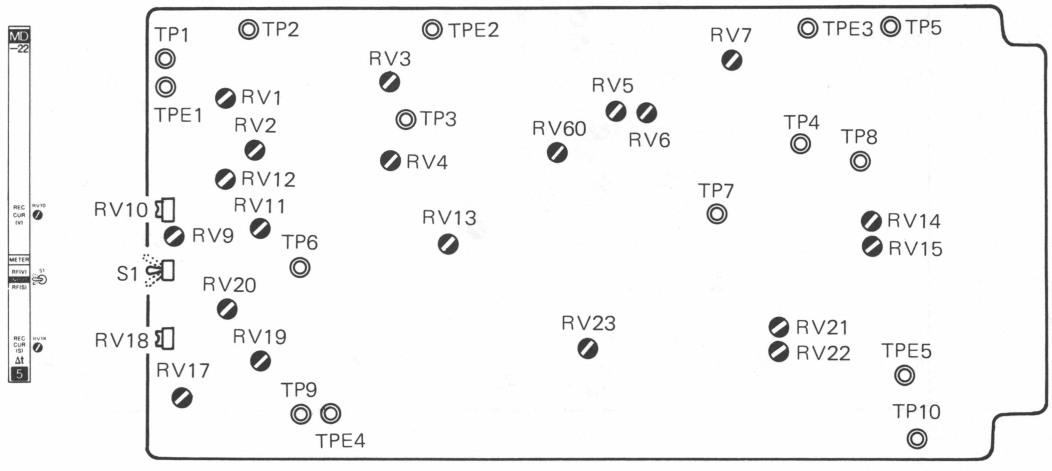
Record a sports program or other pictures which move quickly, and play it back. When the mode is switched from +1 speed to still, check that the tape stops in about 0.2 sec and after stopping the picture does not flow or the movements do not return.
Check the access time when the mode is switched from still to +1 speed. If there is any trouble, check the capstan and reel servo systems (in particular, motor and drive power supply system).

SECTION 15
Δt SYSTEM ALIGNMENT
(For Serial No. up to 10999)

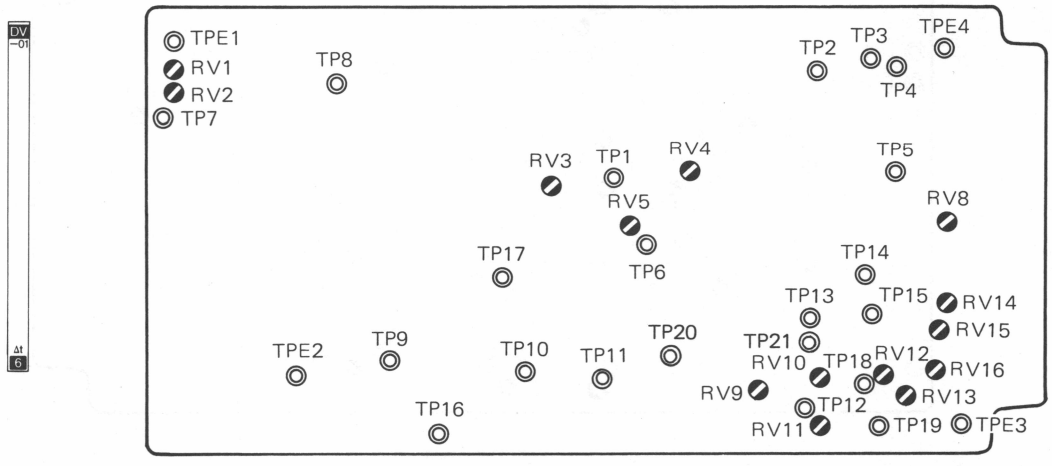
EQ-02 Board



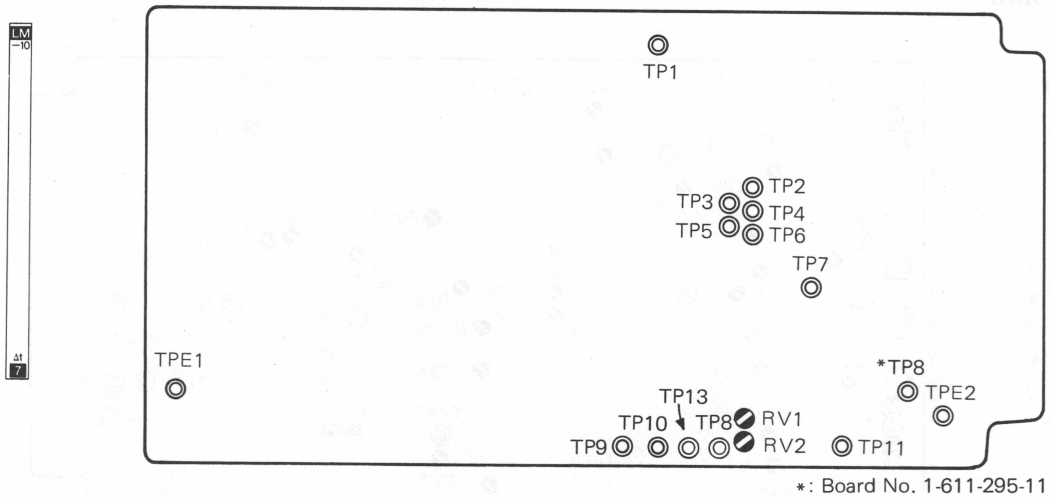
MD-22 Board



DV-01 Board



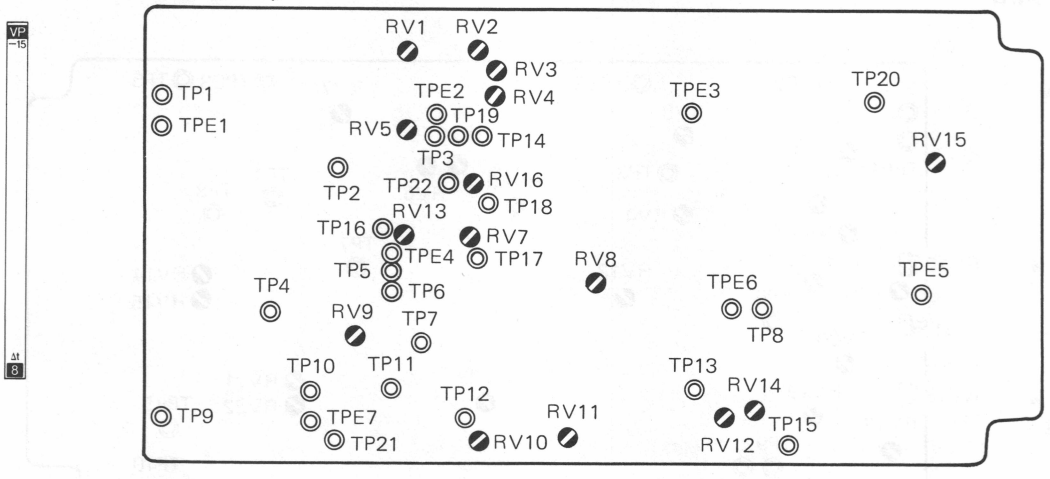
LM-10 Board



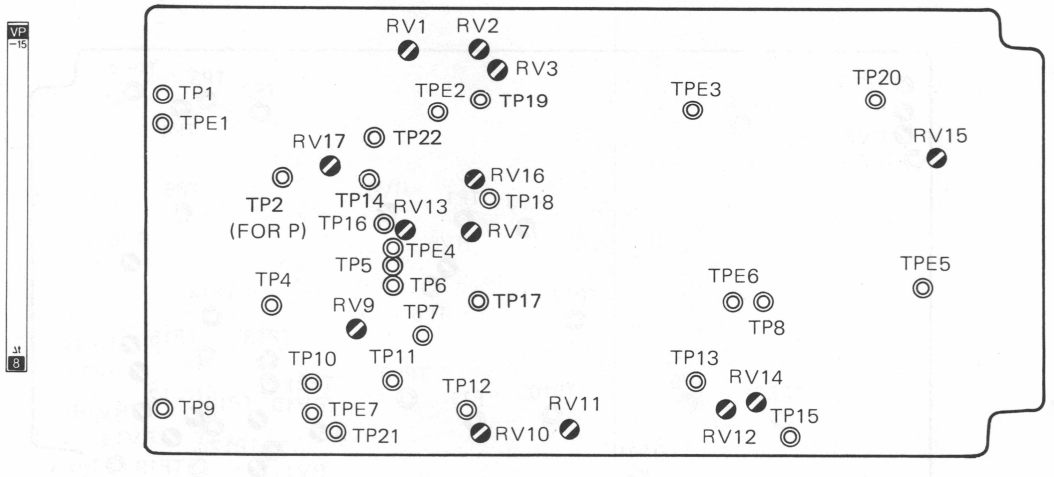
*: Board No. 1-611-295-11

VP-15 Board

1-611-296-11, 12

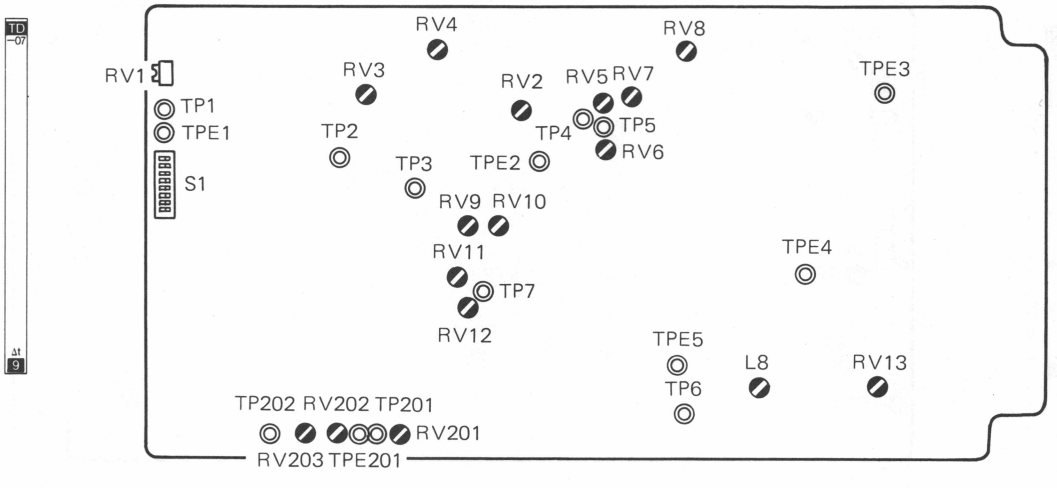


1-611-296-13 and up

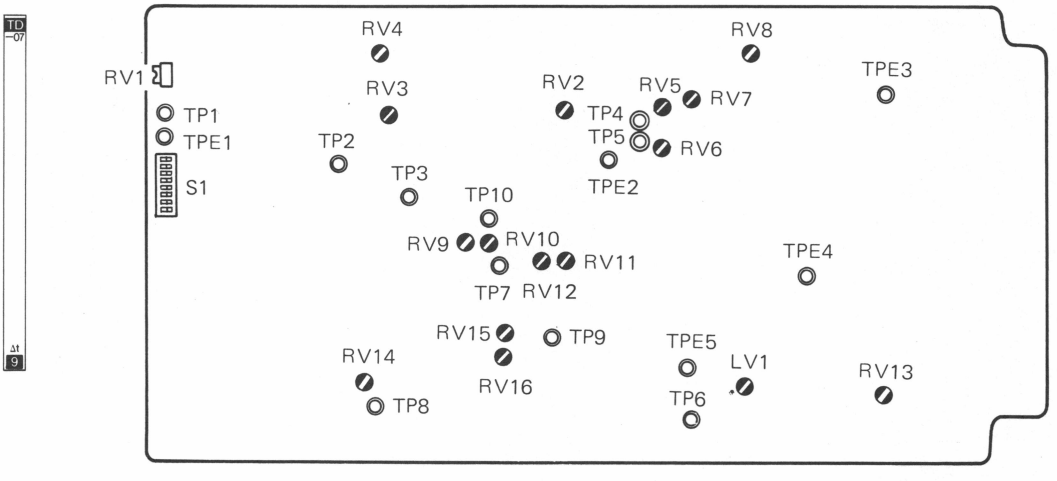


TD-07 Board

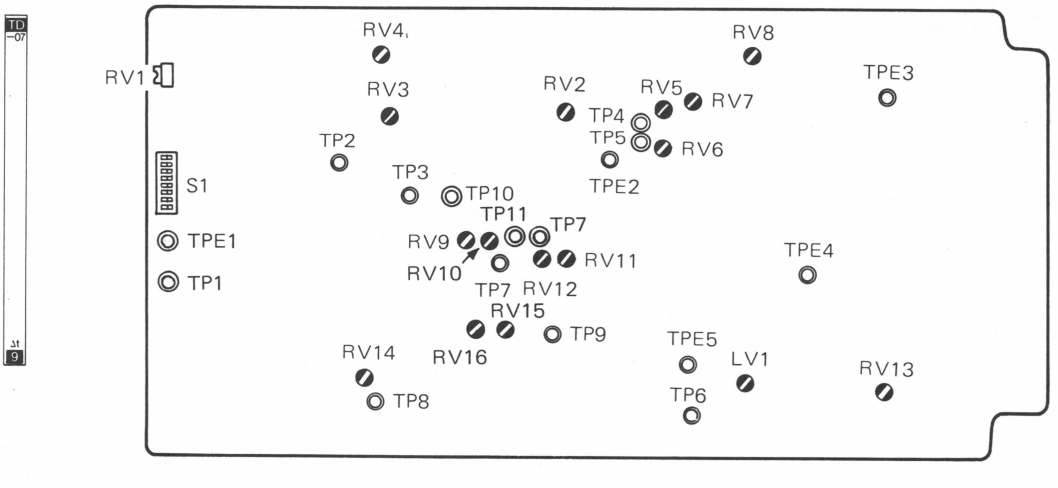
1-611-297-11



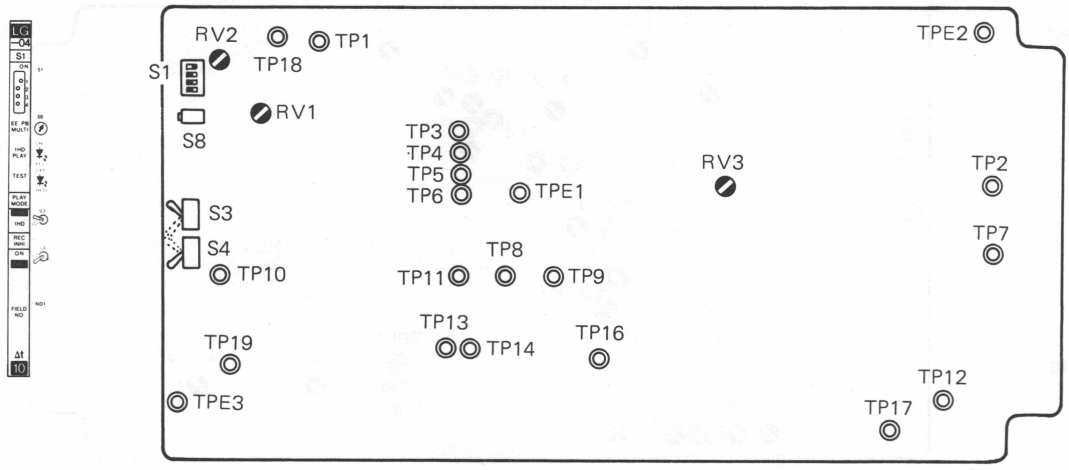
1-611-297-12



1-611-297-13 and up



LG-04 Board


LG
-04
S1
FIELD NO
Δt
10
RV2
TP18
TP1
S1
RV1
S8
TP3
TP4
TP5
TP6
TPE1
RV3
TPE2
TP2
TP7
S3
S4
TP10
TP8
TP11
TP9
TP13
TP14
TP16
TP19
TPE3
TP12
TP17

15-1. PREPARATION FOR ADJUSTMENT

Set the switches, controls and jumper plugs as follows.

VP-15 Board

JP2, 4, 7:		Short
RV4	Δø GAIN:	Maximum Clockwise
RV5	Δø LEVEL:	Mid-rotation
RV8	RD START PULSE WIDTH:	Mid-rotation
RV14	VP VIDEO LEVEL:	Maximum Clockwise
S1	TEST/NORM Switch:	OFF (NORMAL)
S2	Δø /DTV Switch:	OFF (Δø)
S3	NTSC Switch:	ON (NTSC)
S4	TEST/NORM Switch:	OFF (NORMAL)
S5	TEST/NORM Switch:	ON (NORMAL)

LM-10 Board

JP4	WR CK DELAY SELECT:	Short
S1-1	525/625 Switch:	ON(525)
S1-2	4F/8F Switch:	ON(4F)
S1-3	MEMORY SELECT Switch:	OFF (NORMAL)
S2	BURST ON/OFF Switch:	ON
S3	WR ADRS PRESET Switch:	"8"
S4	WR ADRS PRESET Switch:	"C"
S5	WR ADRS PRESET Switch:	"1"
S6	WR ADRS 0 PRESET Switch:	"7"
S7	WR ADRS 0 PRESET Switch:	"E"
S8	WR ADRS 0 PRESET Switch:	"1"

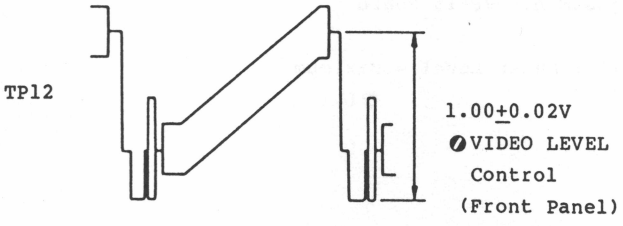
TD-07 Board

RV6	Δf LEVEL:	Mid-rotation
S3	MANUAL SHIFT Switch :	OFF

15-2. VP VIDEO INPUT LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

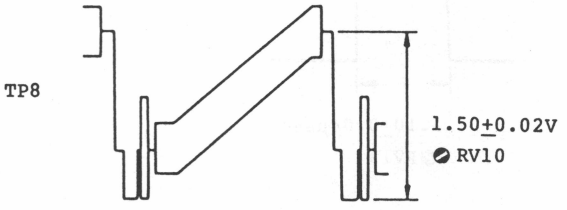
Adjustment VP-15 Board



15-3. VP VIDEO LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment VP-15 Board



15-4. SUBCARRIER FREQUENCY ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board

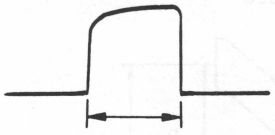
TP11 : Burst Level = Maximum
⊘LV1

15-5. WRITE H DELAY ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board

TP17



1.10±0.04μsec
⊘RV13

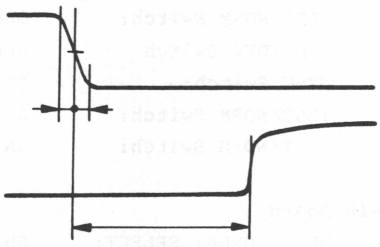
15-6. VP VIDEO CLAMP ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board

TP8
Trailing Negative
Edge of H Sync

TP7



1.0±0.1μsec
⊘RV9

15-7. VP VIDEO A/D CONVERTER REFERENCE VOLTAGE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

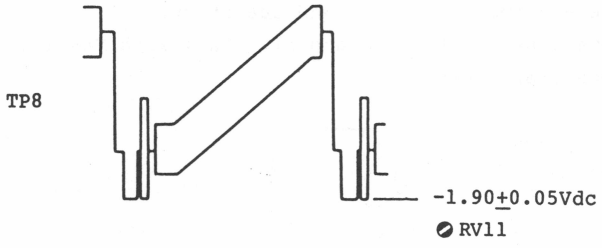
Adjustment VP-15 Board

TP13 = -2.00±0.02Vdc
⊘RV12

15-8. VP VIDEO DC LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment VP-15 Board



15-9. Δφ READ START ADJUSTMENT

15-9-1. Δφ A/D Conv. Ref. Voltage Adjustment

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board
Set TEST/NORM switch S5 to off (TEST) position.

TP19 = 2.00±0.02Vdc
RV3

Reset S5 to on.

15-9-2. Δφ Sampler Offset Adjustment

This adjustment is necessary when the board number of the VP-15 board is 1-161-296-11.

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board
Set the TEST/NORM switch S1 to on (TEST) and short-circuit TP3 to GND with jumper.

TP14 = 0±0.02Vdc
RV6

Reset S1 to off and remove the jumper.

15-9-3. Δφ A/D Converter Offset Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board
Set the TEST/NORM switch S1 to on (TEST).
When the board No. is 1-611-296-11, short-circuit TP3 to GND with jumper.

Observe TP18 and adjust ◐RV2 so that the falling pulse just disappears.

Reset S1 to off. When the board No.is 1-611-296-11, remove the jumper.

15-9-4. Δf Gain Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC SLOW PRESET:VAR 4/30
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board
Make a normal recording and cue it up.
Preset the Δt REC SLOW and play back with VAR 4/30 times slow speed.

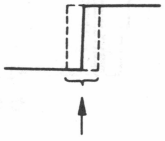
IC3H pin-1 = -0.65±0.05Vdc
◐RV16

15-9-5. Δφ Gain Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC SLOW PRESET:VAR 1/60
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment
Trigger oscilloscope from TP9 on the DM-25 board.
Make a normal recording and cue it up.
Preset the Δt REC SLOW and play back with VAR 1/60 times slow speed.

IC3H pin-5
(DV-01)



Lock
◐RV1/VP-15

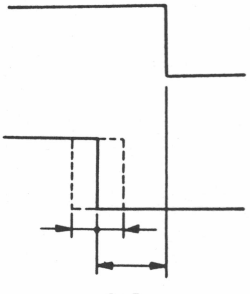
15-9-6. Δφ Input DC Level Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC SLOW PRESET:VAR 1/60
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment
Trigger oscilloscope from TP9 on the DM-25 board.
Make a normal recording and cue it up.
Preset the Δt REC SLOW and play back with VAR 1/60 times slow speed.

VIDEO OUT
(LINE-3)

TP7
(DV-01)



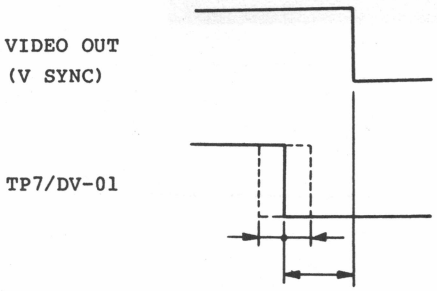
0±5μsec
◐RV7/VP-15

15-10. DTV COMPENSATOR READ START ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC STILL PRESET
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Set the Δϕ /DTV switch S2 on the VP-15 board to on.
Make a normal recording and cue it up.
Preset the Δt REC STILL and press the FWD STEP button twice.

Step 2. Adjustment



3±1μsec
◐RV15/VP-15

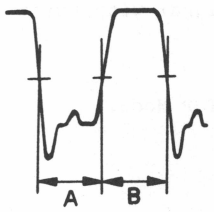
Reset Δϕ /DTV switch S2 on the VP-15 board to off.

15-11. WRITE CLOCK DUTY ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment

TP11/LM-10



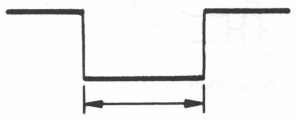
A = B
◐RV13/TD-07

15-12. BURST KILLER PULSE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment LM-10 Board

IC6-O pin-12

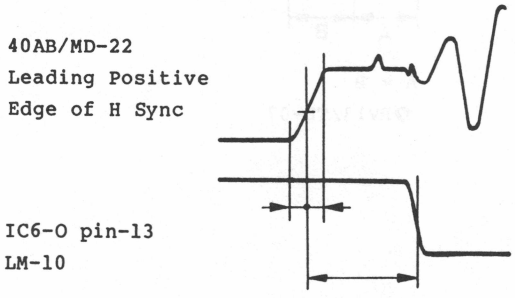


3.5±0.3μsec
◐RV2

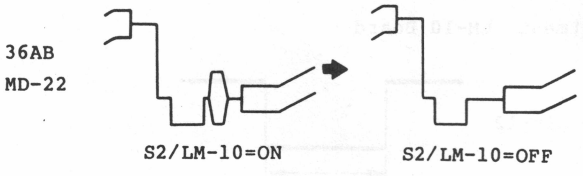
15-13. BURST KILLER PULSE POSITION ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP → Δt REC STILL PRESET
Setting of Switches & Controls;
PICTURE MONITOR Sel:DEMOD OUT
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. Adjustment
Place machine in STOP Mode.



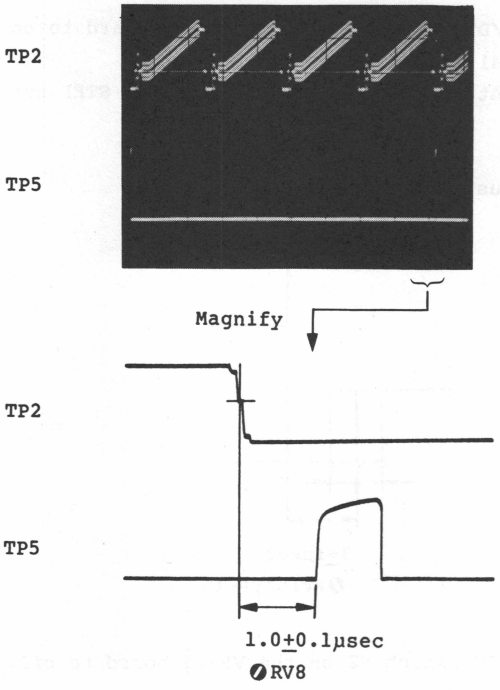
Step 2. Check
Preset the Δt REC STILL.
Check that the burst will disappear when the BURST ON/OFF switch S2 on the LM-10 board is set to off. Also, check the replaced level which correspond to the burst portion is equal to the pedestal level.



15-14. SYNC-TIP CLAMP PULSE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment DV-01 Board

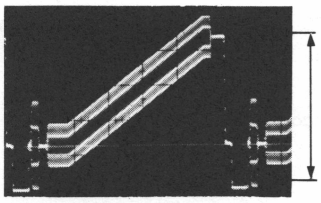


15-15. D/A GAIN ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment DV-01 Board

TP2



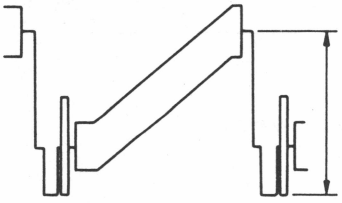
0.90±0.01V
RV1

15-16. PR VIDEO LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment DV-01 Board

TP1



1.00±0.01V
RV4

15-17. PR VIDEO PEDESTAL LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DV-01 Board

TP1:PEDESTAL = 0±0.1Vdc
RV3

15-18. D/A GAIN FINE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Observe the edge connector pin-36AB on the DV-01 board and pin-40AB on the MD-22 board.

Step 2. Adjustment

Level Difference of Video Signals = 0±0.02V
RV1/DV-01

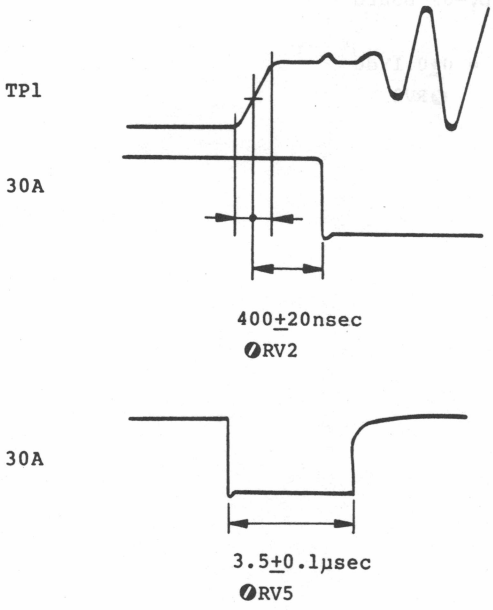
Repeat

Level Difference of Pedestal Level = 0±0.1Vdc
RV3/DV-01

15-19. BURST GATE PULSE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DV-01 Board



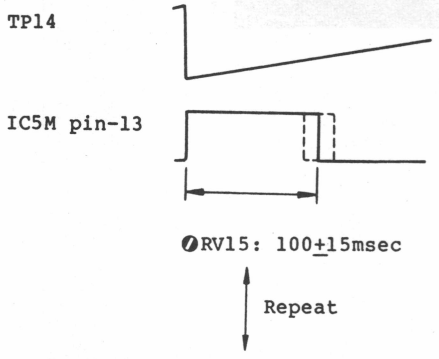
After the adjustment, confirm the section 15-33 "Δt REC Level Adjustment".

15-20. Δφ LEVEL AND OFFSET ADJUSTMENT

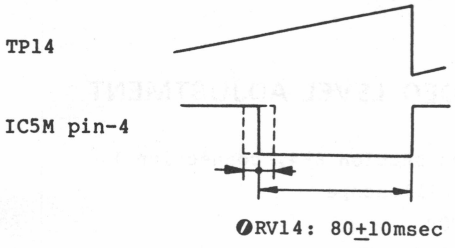
Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC SLOW PRESET:VAR 1/60
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. DV-01 Board
Make a normal recording and cue it up.
Preset the Δt REC SLOW and play back with VAR 1/60 times slow speed.

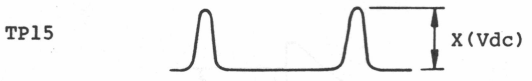
Trigger oscilloscope from TP14.



Trigger oscilloscope from pin-4 of IC5M.



Step 2. DV-01 Board
Adjustment of this step is necessary when the board number of the DV-01 board is 1-611-294-11.



$$TP13 = \frac{X}{2} \pm 0.1Vdc / RV10$$

15-21. Δf LEVEL AND OFFSET ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Digital Voltmeter
Mode of VTR; See respective steps.
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. DV-01 Board
Short-circuit as follows.
TP18 (or IC5Q pin-3) to GND
Edge Connector pin-25B to GND.

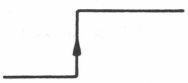
Step 2. Adjustment DV-01 Board
Place machine in STOP mode.
Voltage Between TP19(or IC5Q #6) and GND =0±1mVdc
◐RV12

Remove the jumpers.

Step 3. DV-01 Board
Preset the Δt REC SLOW and switch 1/60 and STILL alternately, then adjust ◐RV13 at the position of transition from low to high and/or high to low as follows.

Δt REC SLOW:1/60 → STILL

IC6M pin-13



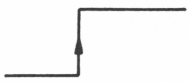
Δt REC SLOW:STILL → 1/60

IC6M pin-13

Step 4. DV-01 Board
Switch VAR 5/30 and VAR 4/30 alternately, and adjust ◐RV16 at the position of transition from low to high and/or high to low as follows.

VAR 5/30 → VAR 4/30

IC6M pin-4



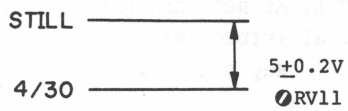
VAR 4/30 → VAR 5/30

IC6M pin-4

Repeat steps 3 and 4 several times.

Step 5. DV-01 Board
Preset the Δt REC SLOW and switch 4/30 and STILL alternately, and adjust as follows.

IC5N pin-1



Step 6. DV-01 Board
Preset the Δt REC SLOW and adjust in STILL.

IC5N pin-1 = -0.6±0.1Vdc
◐RV9

15-22. A/D CONVERTER REFERENCE VOLTAGE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board
Set ADJ/NORMAL switch S2 to off.

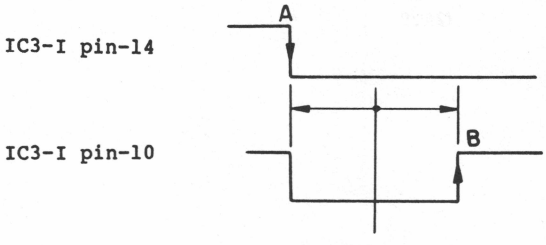
TP5 = 2±0.01Vdc
◐RV7

Reset S2 to on.

15-23. Δf STILL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; Δt REC SLOW PRESET:STILL
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board
Preset the Δt REC SLOW and adjust in STILL.
Turn ◐RV8 gradually clockwise and adjust ◐RV8 in the middle of the positions A and B as shown below.



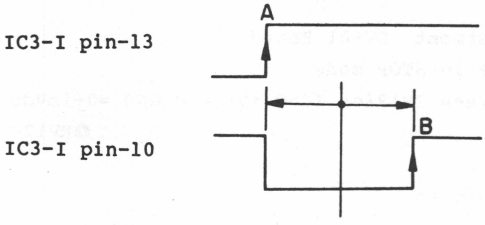
◐RV8 (Middle)

After the adjustment, confirm the level at pins 10, 11, 12, 13 and 14 (A to E) of IC3-I is low.

15-24. Δf SLOW ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; Δt REC SLOW PRESET:VAR 4/30 → STILL
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. Adjustment TD-07 Board
Preset the Δt REC SLOW and play back with VAR 4/30 times slow speed. Turn ◐RV5 gradually counter-clockwise and adjust ◐RV5 in the middle of the positions A and B as shown below.



◐RV5 (Middle)

After the adjustment, confirm the level at pins 10, 11, 12, 13 and 14 (A to E) of IC3-I as follows.
IC3-I:pin-10 (A) = LOW Level
pin-11 (B) = LOW Level
pin-12 (C) = LOW Level
pin-13 (D) = HIGH Level
pin-14 (E) = HIGH Level

Step 2. TD-07 Board
Preset the Δt REC SLOW and confirm the following levels in STILL.
IC3-I:pin-10 (A) = LOW level
pin-14 (E) = LOW level

15-25. PLL LOCK PHASE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board

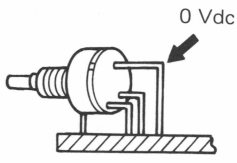
TP6 0±0.1Vdc
◐LV1 (*◐L8)

* When the board number of the TD-07 board is 1-611-297-11, adjust ◐L8 instead of ◐LV1.

15-26. R/P HEAD HEIGHT ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; REC
Setting of Switches & Controls;
TAPE/EE Sel:TAPE
DT-04 Board:S4 =OFF
TD-07 Board:S1-3=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

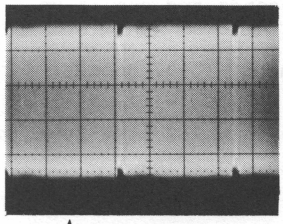
Adjustment TD-07 Board
Adjust the voltage at the center lead of the R/P Head Height control ◐RV1 on the TD-07 board for 0±0.5Vdc by ◐RV1.



15-27. STRAIN GAUGE OFFSET AND LEVEL ADJUSTMENT

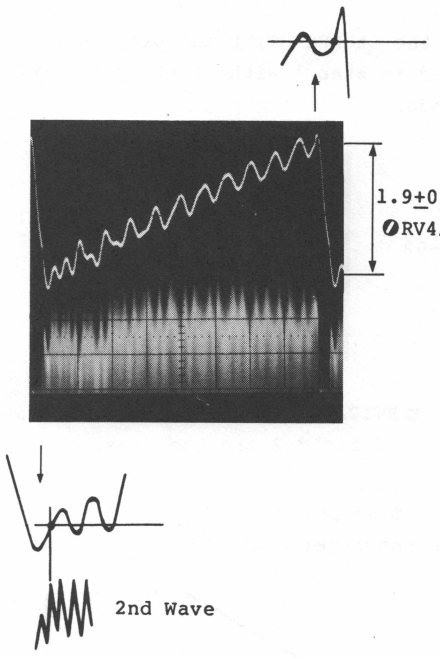
Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
TAPE/EE Sel:TAPE
DT-04 Board:S4 =OFF
TD-07 Board:S1-3=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. Offset Adjustment
Place machine in REC mode.

TP5/EQ-02 
Middle of RF = Maximum
◐RV2/TD-07

Step 2. Offset Check TD-07 Board
TP1 = 0±80mVdc

Step 3. Level Adjustment
Record a few seconds and play it back in the STILL (press the FWD STEP button) mode.



Repeat step 1.

15-28. REC DT ADJUSTMENT (1)

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
DT-04 Board:S4 =ON
TD-07 Board:S1-3=OFF
S1-5=ON
S1-6=ON
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

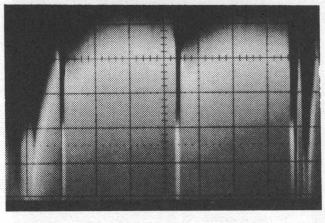
Step 1.
Record a few seconds and cue it up.

Step 2. Adjustment TD-07 Board
When the board No. is 1-611-297-11.
Place machine in VAR 1 time speed mode and turn ◐RV12 maximum clockwise.
Check Point: IC4D pin-1

When the board No. is 1-611-297-12 & up.
Place machine in VAR 1 time speed mode and turn ◐RV12 maximum counterclockwise.
Check Point: IC3F pin-1

Step 3.
Preset the Δt REC STILL and play back the segment recorded in step 1 with STILL (press FWD STEP button) mode.

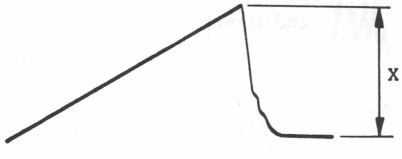
TP5/EQ-02



Adjust ◐RV12/TD-07 so that the RF waveforms in field-1 and field-2 are the same.

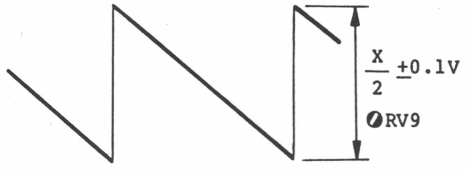
Step 4. TD-07 Board
Measure the level X at TP1.

TP1



Step 5. TD-07 Board
Set S1-6 to off.
Preset the Δt REC SLOW and play back the segment recorded in step 1 with VAR 1/30 times speed.

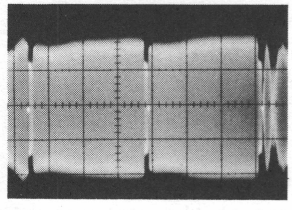
TP1/TD-07



X:Value measured in step 4.

Step 6.
Set S1-6 on the TD-07 board to on.
Preset the Δt REC STILL and play back the segment recorded in step 1 with STILL (press FWD STEP button) mode.

TP5/EQ-02



Adjust ◐RV10/TD-07 so that the middle of the RF waveform in each field-1 and field-2 is maximum.

Reset S1-6 to off.

15-29. REC DT ADJUSTMENT (2)

Note: This section can be adjusted by the ordinary oscilloscope, however, when the digital storage oscilloscope TEK. Type 468 or eqivalent is used, the adjustment can be performed more accurately.

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
or Digital Storage Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FIELD
DT-04 Board: S4 =OFF
TD-07 Board: S1-3=OFF
S1-5=ON
S1-6=OFF
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

PROCEDURE A: Using Digital Storage Oscilloscope

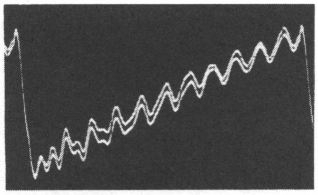
Step 1.
Record a few minutes and cue it up.

Step 2.
Preset the Δt REC STILL.
Press the FWD STEP or the SEARCH TO CUE button, and check the message "RDY STIL" is displayed on the block 5 of the control panel.

Step 3.
Press the FWD STEP button and after the tape stops, store the waveform.
Note: Do not use the segment where the signal is recorded once with STILL REC.

Step 4.
Press the EDIT/REC button and compare the level difference with the level of step 3.

TP1/TD-07



Step 5.
While repeating the EDIT/REC, adjust ◐RV10 (LEVEL) and ◐RV12 (RAMP) for no level difference and the same ramp as against the waveform which is memorized in step 3.

Step 6.
Repeat steps 3 and 4 for several times and check the average of the level difference is 0±0.1V or less.

PROCEDURE B: Using Ordinary Oscilloscope

Step 1.
Record a few minutes and cue it up.

Step 2.
Preset the Δt REC STILL.
Press tne FWD STEP button or the SEARCH TO CUE button, and check the message "RDY STIL" is displayed on the block 5 of the control panel.

Step 3.
Press the FWD STEP button, and memorize at the beginning and at the end of the waveforms.
Note: Do not use the segment where the signal is recorded once with STILL REC.

Step 4.
Press the EDIT/REC button and compare the level difference with the level of step 3.

Step 5.
While repeating the EDIT/REC , equalize the level after the EDIT/REC with the level which is memorized in step 3 by ◐RV10 (LEVEL) and ◐RV12 (RAMP).

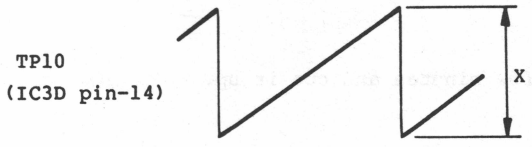
Step 6.
Repeat steps 3 and 4 for several times and check the average of the level difference is 0±0.1V or less.

15-30. Δφ DELAY COMPENSATOR ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FIELD
DT-04 Board: S4 =OFF
TD-07 Board: S1-3=OFF
S1-5=ON
S1-6=OFF
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

When the board number of the TD-07 board is 1-611-297-11, perform the adjustment according to the round brackets ().

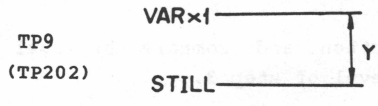
Step 1.
Record a few minute and cue it up.
Preset Δt REC SLOW and memorize the level X with VAR 1/30 times speed.



Step 2.
Adjust in STILL mode.

TP9(TP202) = 0±0.1Vdc
◐RV16 (◐RV203)

While switching the mode of VTR STILL/VAR 1x speed, adjust the level Y against the level X memorized in step 1 as follows.



Y = X±0.1V
◐RV15 (◐RV202)

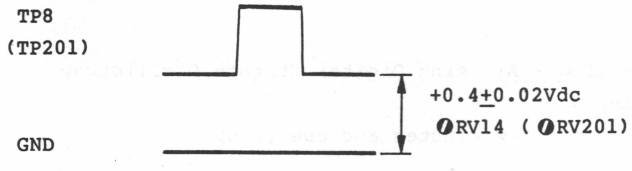
Repeat step 2.

15-31. SLIP RING NOISE CANCELLER ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STANDBY ON
Setting of Switches & Controls;
R/P MODE Sel:FIELD
DT-04 Board: S4 =OFF
TD-07 Board: S1-3=OFF
S1-5=ON
S1-6=OFF
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

When the board number of the TD-07 board is 1-611-297-11, perform the adjustment according to the round brackets ().

Adjustment TD-07 Board

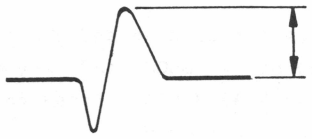


15-32. LINEARITY COMPENSATOR ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STANDBY ON
Setting of Switches & Controls;
TD-07 Board:S1-3=ON
S1-4=ON
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board

Edge Connector
pin-21A



When the serial number is 10101 and higher, after the adjustment, reset S1-3 to off.

15-33. Δt REC LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; Normal REC → STILL → Δt REC STILL
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel:SELECT VIDEO
TD-07 Board:S1-1=ON
S1-2=ON
S1-3=ON (S/N;up to 10099)
OFF(S/N;10101 & up)
S1-4=ON
S1-5=ON
S1-6=OFF
S1-7=ON
S1-8=OFF
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Record a few seconds and play it back in STILL, then measure the WFM MONITOR OUTPUT level X.

Step 2.
Preset the Δt REC STILL. Press the FWD STEP or the SEARCH TO CUE button and confirm the message "RDY STIL" is displayed on the BLOCK 5 on the control panel.

Step 3.
Press the EDIT/REC button to execute Δt STILL REC and adjust the WFM MONITOR OUTPUT level Y against the level X measured in step 1 as follows.

Y = X±5mV
RV60/MD-22

15-34. CONFIRMATION AFTER ADJUSTMENT

15-34-1. Confirmation of STEP Recording

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FRAME
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Make a normal recording and cue it up.
Set S9-8 on the SY-80 board to on.
Preset the Δt REC STEP and depress the EDIT/REC button (STEP REC is automatically repeated for 255 times) after the message "RDY STEP" is displayed.

Step 2.
Play back the segment where recorded in STEP REC mode with normal R/P mode and confirm the waveform at TP1 on the TD-07 board is much the same as the normal recording waveform recorded in step 1.
If not, perform the check of sections 15-28, 15-29 and 15-30. After the confirmation, reset S9-8 on the SY-80 board to off.

15-34-2. Confirmation of SLOW Recording

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FRAME
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Make a normal recording and cue it up.
Preset the Δt REC SLOW and set the tape speed to 4/30 by the SEARCH DIAL. Press the EDIT/REC button and make a slow recording.

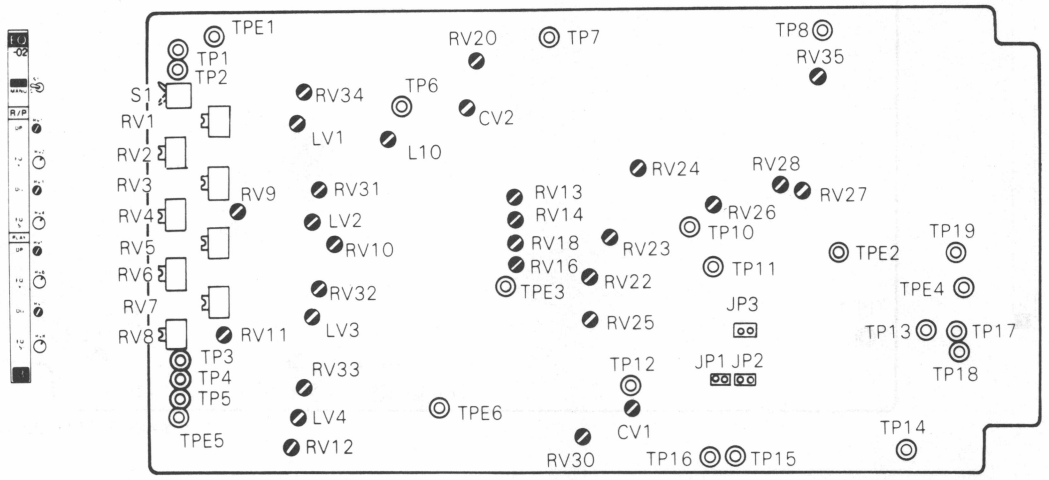
Step 2.
Play back the segment where recorded in SLOW REC mode with normal R/P mode. Confirm the waveform at TP1/TD-07 is much the same as the normal recording waveform recorded in step 1.
If not, perform the check and/or the adjustment of sections 15-28, 15-29 and 15-30, and when the adjustment is performed, confirm from the step 1 of section 15-34-1.

Step 3.
Make sure there is no picture dropout or picture shift toward horizontally or vertically.
- If picture will be dropped out, perform sections 15-20 and 15-21.
- If picture will be shifted horizontally, confirm the CF detector on the DV-01 board.
- If picture will be shifted vertically, perform sections 15-9 and 15-25.

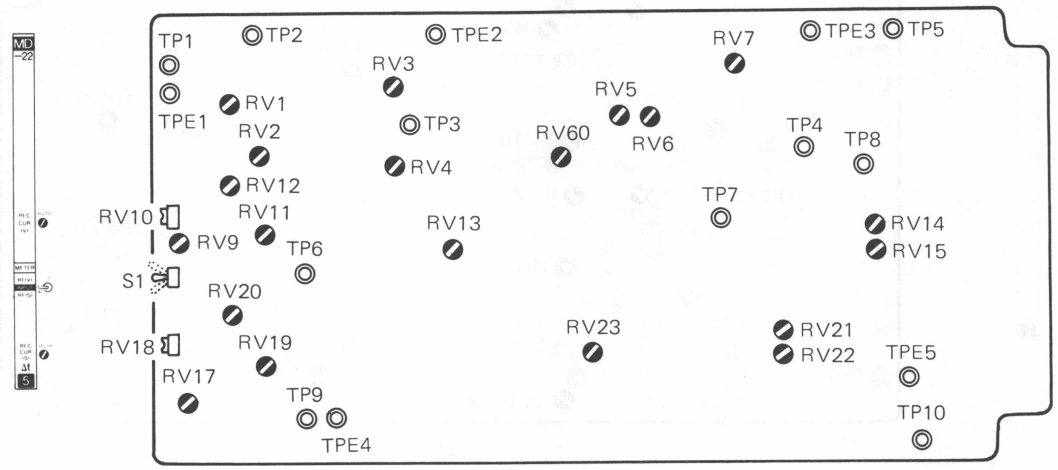
SECTION 15
Δt SYSTEM ALIGNMENT

(For Serial No. 11001 and up)

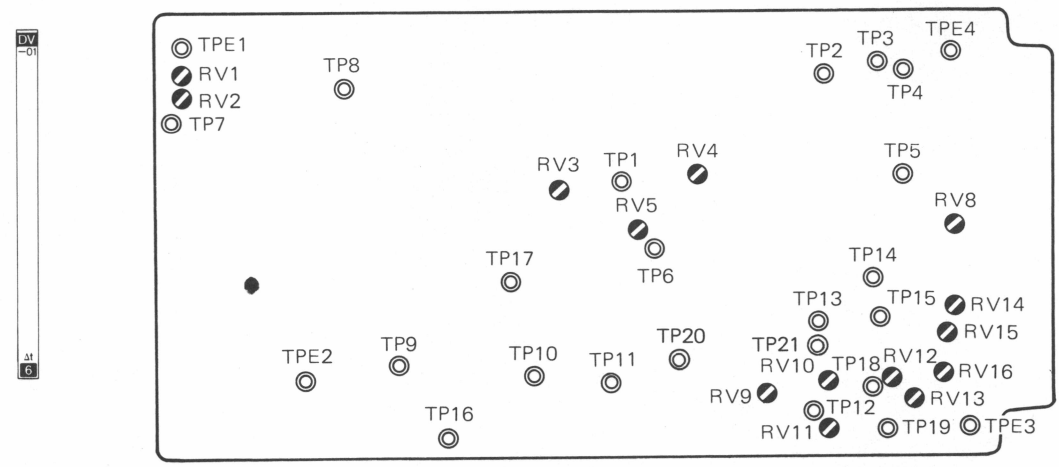
EQ-02 Board



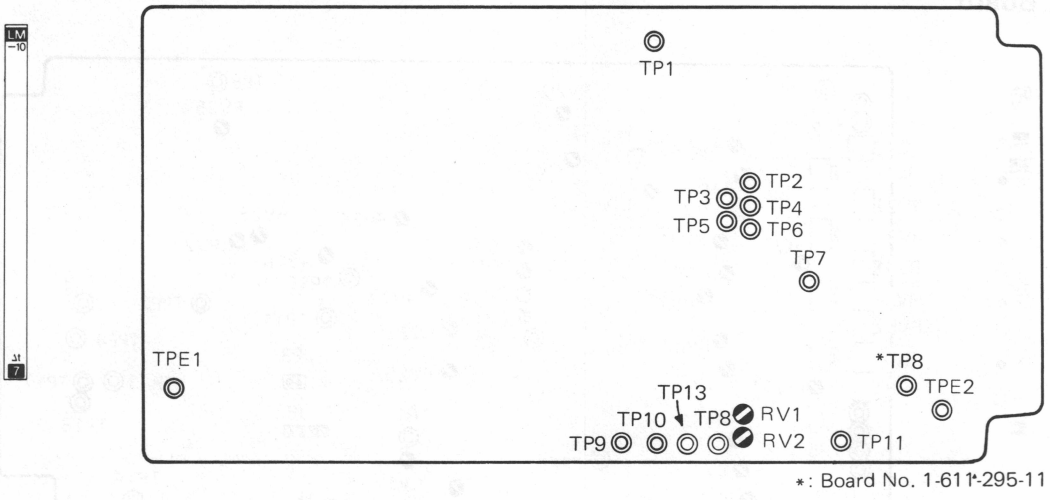
MD-22 Board



DV-01 Board



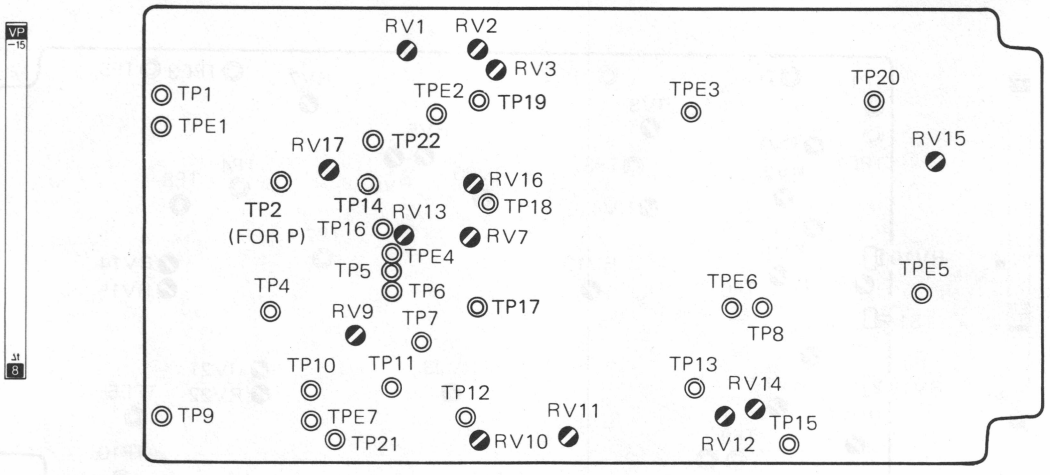
LM-10 Board



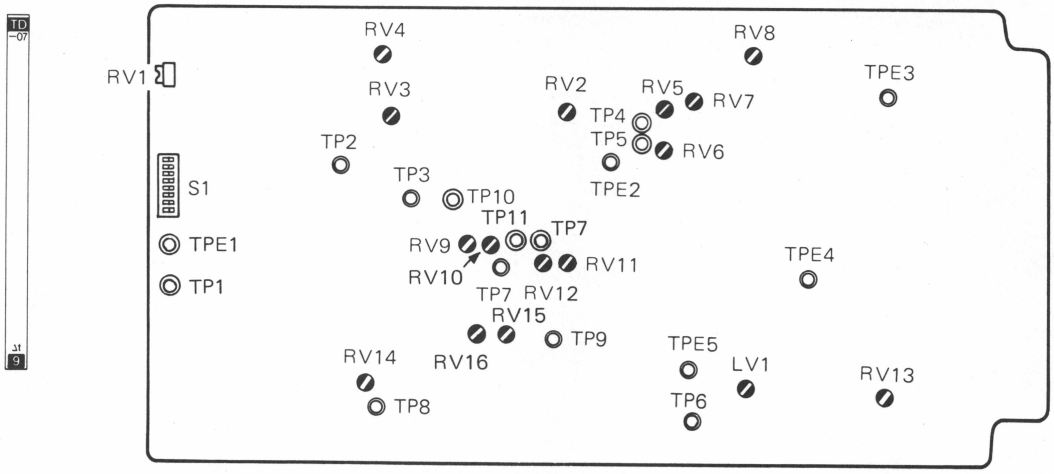
*: Board No. 1-611-295-11

VP-15 Board

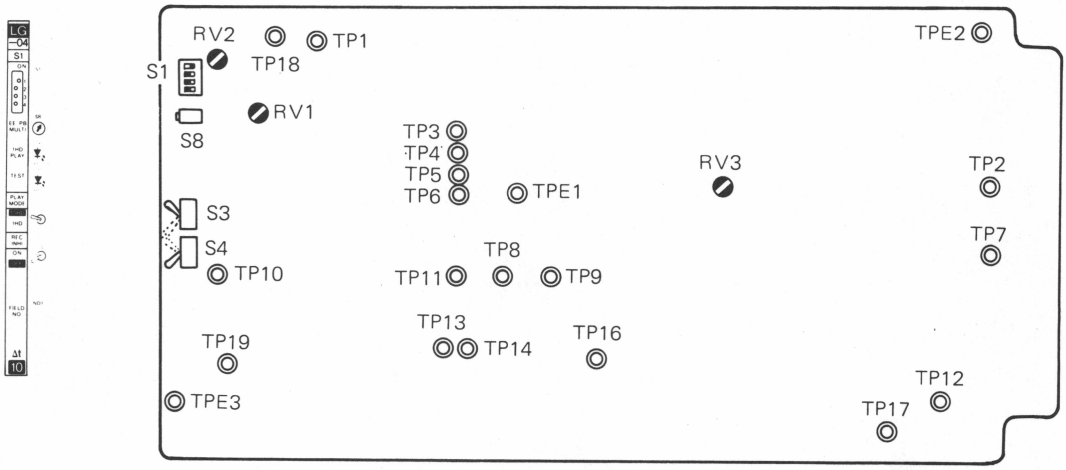
1-611-296-13 and up



TD-07 Board



LG-04 Board



15-1. PREPARATION FOR ADJUSTMENT

Set the switches, controls and jumper plugs as follows.

VP-15 Board

RV14	VP VIDEO LEVEL:	Maximum Clockwise
S1	TEST/NORM Switch:	OFF (NORMAL)
S2	Δ ø /DTV Switch:	OFF (Δ ø)
S4	TEST/NORM Switch:	OFF (NORMAL)
S5	TEST/NORM Switch:	ON (NORMAL)
S6	TEST/NORM Switch:	OFF(NORMAL)

LM-10 Board

JP4	WR CK DELAY SELECT:	Short
S2	BURST ON/OFF Switch:	ON

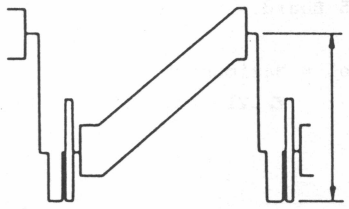
TD-07 Board

RV6	Δf LEVEL:	Mid-rotation
S3	MANUAL SHIFT Switch :	OFF

15-2. VP VIDEO INPUT LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of vTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

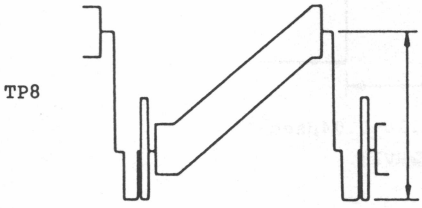
Adjustment VP-15 Board



15-3. VP VIDEO LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment VP-15 Board



15-4. SUBCARRIER FREQUENCY ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board

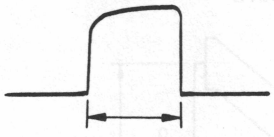
TP11 : Burst Level = Maximum
⊘LV1

15-5. WRITE H DELAY ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board

TP17



1.10±0.04μsec
⊘RV13

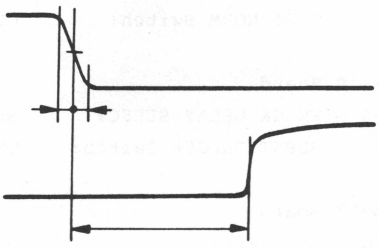
15-6. VP VIDEO CLAMP ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board

TP8
Trailing Negative
Edge of H Sync

TP7



1.0±0.1μsec
⊘RV9

15-7. VP VIDEO A/D CONVERTER REFERENCE VOLTAGE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

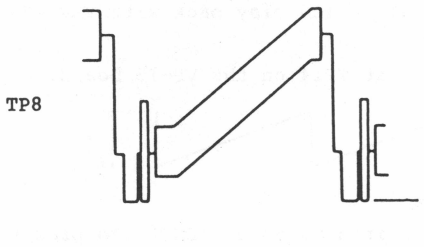
Adjustment VP-15 Board

TP13 = -2.00±0.02Vdc
⊘RV12

15-8. VP VIDEO DC LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment VP-15 Board



15-9. Δφ READ START ADJUSTMENT

15-9-1. Δφ A/D Conv. Ref. Voltage Adjustment

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board
Set TEST/NORM switch S5 to off (TEST) position.

TP19 = 2.00±0.02Vdc
RV3

Reset S5 to on.

15-9-2. Δφ A/D Converter Offset Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment VP-15 Board
Set the TEST/NORM switch S1 to on (TEST).

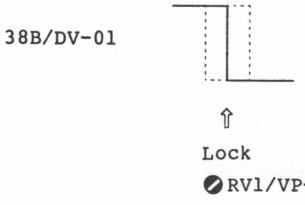
Observe TP18 and adjust RV2 so that the falling pulse just disappears.

Reset S1 to off.

15-9-3. Δφ Gain Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC STILL PRESET:VAR 1/60
Input Signal (VIDEO IN);
Any Signal with Burst

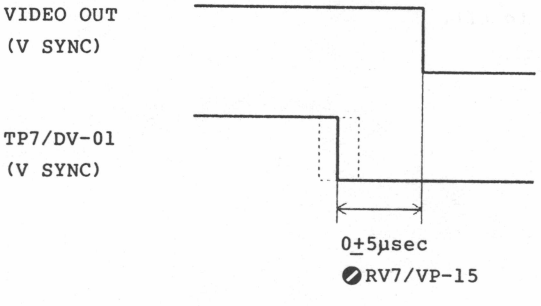
Adjustment
Trigger oscilloscope from TP9(falling edge) on the DM-25 board.
Make a normal recording and cue it up.
Preset the Δt REC STILL and play back with VAR 1/60 times slow speed.



15-9-4. Δφ Input DC Level Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC STILL PRESET:VAR 1/60
Input Signal (VIDEO IN);
Any Signal with Burst

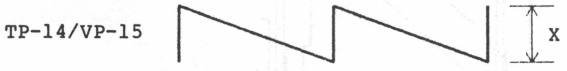
Adjustment
Trigger oscilloscope from TP9 (falling dge) on the DM-25 board. Make a normal recording and cue it up.
Preset the Δt REC STILL and play back with VAR 1/60 times slow speed.



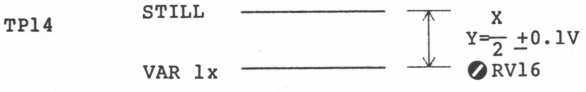
15-9-5. Δf Gain Adjustment

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; Refer to respective steps.
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. VP-15 Board
Make a normal recording and cue it up.
Preset the Δt REC STILL and play back with VAR 1/30 times slow speed.
Measure the level X at TP14 on the VP-15 board.



Step 2. Adjustment
Set the TEST/NORM switch S6 to on(TEST) and preset the Δt REC SLOW.
While switching the STILL and VAR 1x speed alternately, adjust the level Y against the level X as follows.



Step 3.
Be sure to adjust in the STILL mode.
While preseting and/or releasing the Δt REC SLOW mode, adjust the voltage difference at TP14 for 0±20mV by RV17

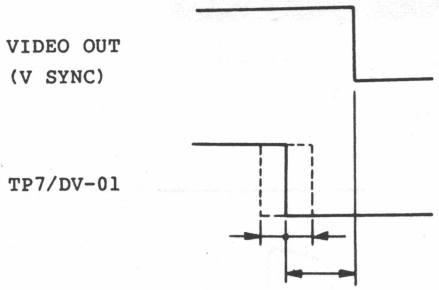
After the adjustment, reset S6 to off.

15-10. DTV COMPENSATOR READ START ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC STILL PRESET
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. VP-15 Board
Trigger oscilloscope from 43A (rising edge) of the edge connector. Set the Δø /DTV switch S2 to on. Make a normal recording and cue it up. Preset the Δt REC STILL and press the FWD STEP button twice.

Step 2. Adjustment

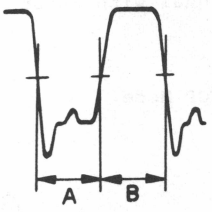


Reset Δø /DTV switch S2 on the VP-15 board to off.

15-11. WRITE CLOCK DUTY ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

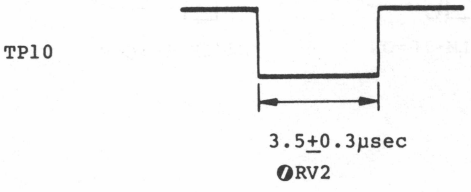
Adjustment



15-12. BURST KILLER PULSE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment LM-10 Board
Set the BURST ON/OFF switch S2 to off.

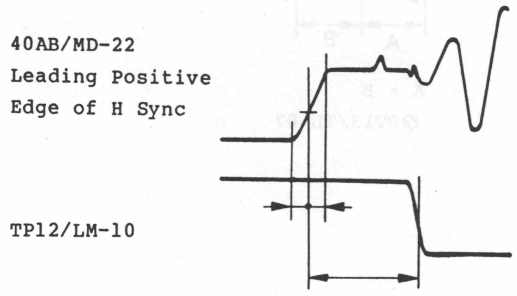


Return S2 to on.

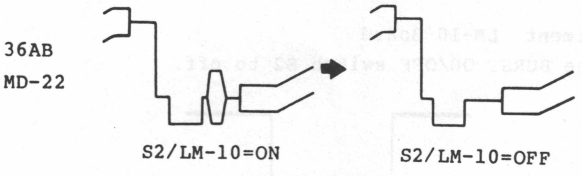
15-13. BURST KILLER PULSE POSITION ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP → Δt REC STILL PRESET
Setting of Switches & Controls;
PICTURE MONITOR Sel:DEMOD OUT
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. Adjustment
Place machine in STOP Mode.



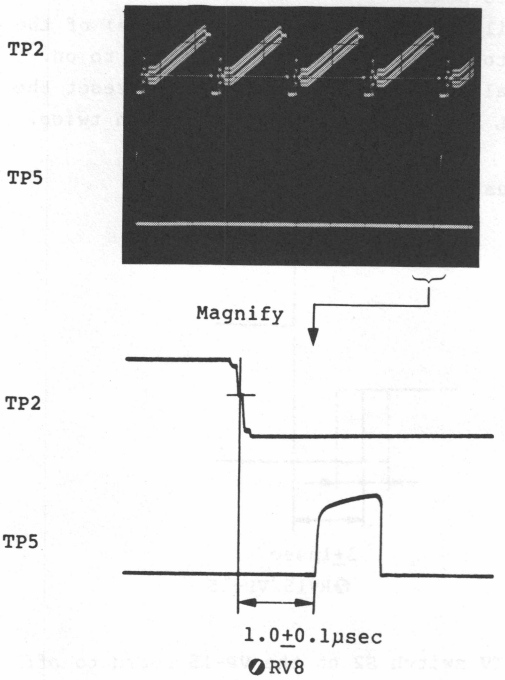
Step 2. Check
Preset the Δt REC STILL.
Check that the burst will disappear when the BURST ON/OFF switch S2 on the LM-10 board is set to off. Also, check the replaced level which correspond to the burst portion is equal to the pedestal level.



15-14. SYNC-TIP CLAMP PULSE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment DV-01 Board

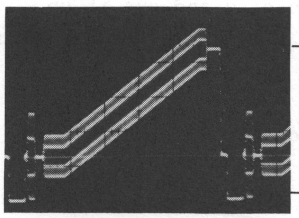


15-15. D/A GAIN ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment DV-01 Board

TP2



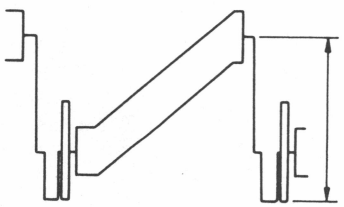
0.90±0.01V
◐RV1

15-16. PR VIDEO LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Adjustment DV-01 Board

TP1



1.00±0.01V
◐RV4

15-17. PR VIDEO PEDESTAL LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DV-01 Board

TP1:PEDESTAL = 0±0.1Vdc
◐RV3

15-18. D/A GAIN FINE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Observe the edge connector pin-36AB on the DV-01 board and pin-40AB on the MD-22 board.

Step 2. Adjustment

Level Difference of Video Signals = 0±0.02V
◐RV1/DV-01

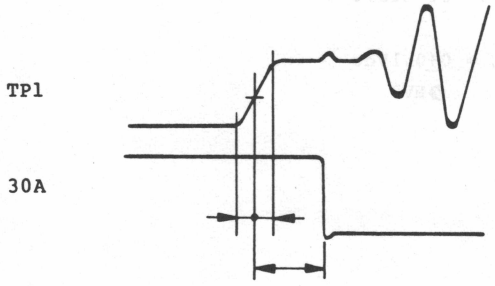
↕ Repeat

Level Difference of Pedestal Level = 0±0.1Vdc
◐RV3/DV-01

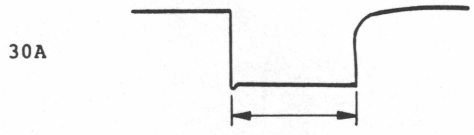
15-19. BURST GATE PULSE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DV-01 Board



400±20nsec
◐RV2



3.5±0.1μsec
◐RV5

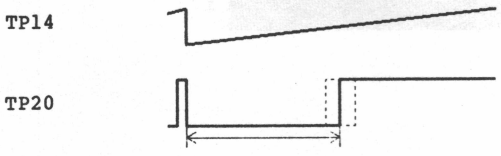
After the adjustment, confirm the section 15-33 "Δt REC Level Adjustment".

15-20. Δφ LEVEL AND OFFSET ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; REC → Δt REC SLOW PRESET:VAR 1/60
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment DV-01 Board
Make a normal recording and cue it up.
Preset the Δt REC SLOW and play back with VAR 1/60 times slow speed.

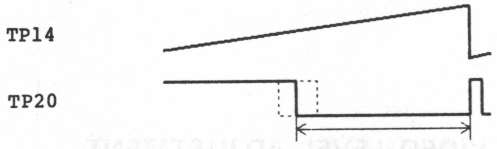
Trigger oscilloscope from TP14.



◐RV15: 100±15msec

Repeat

Trigger oscilloscope from TP20.



◐RV14: 80±10msec

15-21. Δf LEVEL AND OFFSET ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Digital Voltmeter
Mode of VTR; See respective steps.
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. DV-01 Board
Short-circuit as follows.
TP18 to GND
Edge Connector pin-25B to GND.

Step 2. Adjustment DV-01 Board
Place machine in STOP mode.
TP19 = 0±1mVdc
⊘RV12

Remove the jumpers.

Step 3. DV-01 Board
Preset the Δt REC SLOW.
While switching the 1/60 and the STILL alternately, adjust⊘RV13 at the position from on to off and/or off to on as follows.

Δt REC SLOW:1/60 → STILL
LED D12: OFF

Δt REC SLOW:STILL → 1/60
LED D12: BLINK then ON

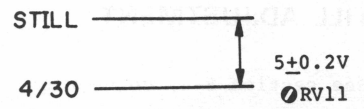
Step 4. DV-01 Board
While switching the VAR 5/30 and VAR 4/30 alternately,adjust⊘RV16 at the position from on to off and/or off to on as follows.

VAR 5/30 → VAR 4/30
LED D13: OFF

VAR 4/30 → VAR 5/30
LED D13: BLINK and ON

Repeat steps 3 and 4 several times.

Step 5. DV-01 Board
Preset the Δt REC SLOW and switch 4/30 and STILL alternately, and adjust as follows.



Step 6. DV-01 Board
Preset the Δt REC SLOW and adjust in STILL.

TP21 = -0.6±0.1Vdc
⊘RV9

15-22. A/D CONVERTER REFERENCE VOLTAGE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Digital Voltmeter
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board
Set ADJ/NORMAL switch S2 to off.

TP5 = 2±0.01Vdc
⊘RV7

Reset S2 to on.

15-23. Δf STILL ADJUSTMENT

Connection; See section 8-4, connection 1.
Mode of VTR; Δt REC SLOW PRESET:STILL
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board
Preset the Δt REC SLOW and adjust in STILL.
Turn ⊘RV8 gradually clockwise and set ⊘RV8 to the mid-range of the "80" display on the ND1.

15-24. Δf SLOW ADJUSTMENT

Connection; See section 8-4, connection 1.
Mode of VTR; Δt REC SLOW PRESET:VAR 4/30 → STILL
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1. Adjustment TD-07 Board
Preset the Δt REC SLOW and play back with VAR 4/30 times slow speed.
Turn ⊘RV5 gradually counterclockwise and set ⊘RV5 to the mid-range of the "98" display on the ND1.

Step 2.
Preset the Δt REC SLOW and confirm the display of the ND1 for "80".

15-25. PLL LOCK PHASE ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP
Input Signal (VIDEO IN);
Any Signal with Burst

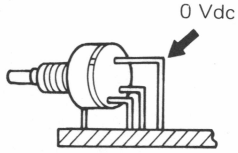
Adjustment TD-07 Board

TP6 0±0.1Vdc
◐LV1

15-26. R/P HEAD HEIGHT ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Digital Voltmeter
Mode of VTR; REC
Setting of Switches & Controls;
TAPE/EE Sel:TAPE
DT-04 Board:S4 =OFF
TD-07 Board:Sl-3=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

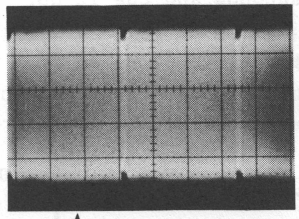
Adjustment TD-07 Board
Adjust the voltage at the center lead of the R/P Head Height control ◐RV1 on the TD-07 board for 0±0.5Vdc by ◐RV1.



15-27. STRAIN GAUGE OFFSET AND LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
TAPE/EE Sel:TAPE
DT-04 Board:S4 =OFF
TD-07 Board:Sl-3=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

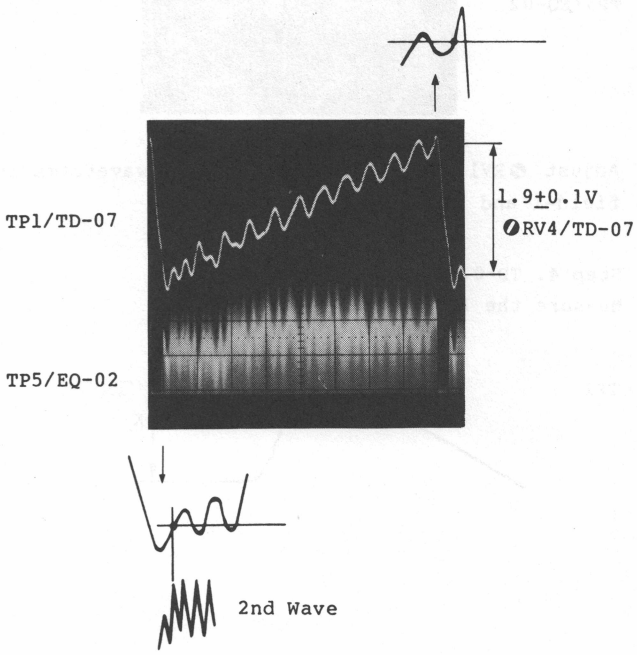
Step 1. Offset Adjustment
Place machine in REC mode.

TP5/EQ-02 

Middle of RF = Maximum
◐RV2/TD-07

Step 2. Offset Check TD-07 Board
TP1 = 0±80mVdc

Step 3. Level Adjustment
Record a few seconds and play it back in the STILL (press the FWD STEP button) mode.



Repeat step 1.

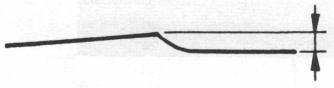
15-28. REC DT ADJUSTMENT (1)

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
DT-04 Board:S4 =ON
TD-07 Board:S1-3=OFF
S1-5=ON
S1-6=ON
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Record a few seconds and cue it up.

Step 2. Adjustment TD-07 Board
Place the machine in VAR 1x speed and turn ◐RV12 maximum counterclockwise.

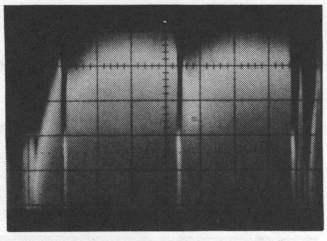
TP11



0±50mV
◐RV11

Step 3.
Preset the Δt REC STILL and play back the segment recorded in step 1 with STILL (press FWD STEP button) mode.

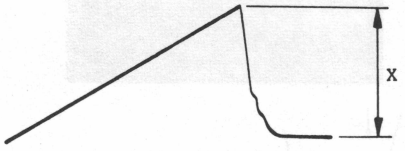
TP5/EQ-02



Adjust ◐RV12/TD-07 so that the RF waveforms in field-1 and field-2 are the same.

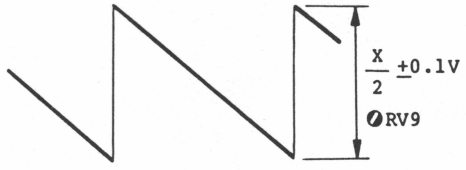
Step 4. TD-07 Board
Measure the level X at TP1.

TP1



Step 5. TD-07 Board
Set S1-6 to off.
Preset the Δt REC SLOW and play back the segment recorded in step 1 with VAR 1/30 times speed.

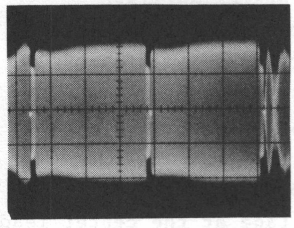
TP1/TD-07



X:Value measured in step 4.

Step 6.
Set S1-6 on the TD-07 board to on.
Preset the Δt REC STILL and play back the segment recorded in step 1 with STILL (press FWD STEP button) mode.

TP5/EQ-02



Adjust ◐RV10/TD-07 so that the middle of the RF waveform in each field-1 and field-2 is maximum.

Reset S1-6 to off.

15-29. REC DT ADJUSTMENT (2)

Note: This section can be adjusted by the ordinary oscilloscope, however, when the digital storage oscilloscope TEK. Type 468 or eqivalent is used, the adjustment can be performed more accurately.

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
or Digital Storage Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FIELD
DT-04 Board: S4 =OFF
TD-07 Board: S1-3=OFF
S1-5=ON
S1-6=OFF
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

PROCEDURE A: Using Digital Storage Oscilloscope

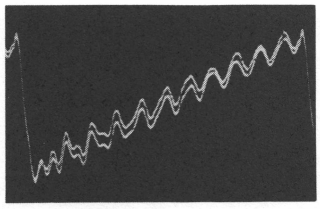
Step 1.
Record a few minutes and cue it up.

Step 2.
Preset the Δt REC STILL.
Press the FWD STEP or the SEARCH TO CUE button, and check the message "RDY STIL" is displayed on the block 5 of the control panel.

Step 3.
Press the FWD STEP button and after the tape stops, store the waveform.
Note: Do not use the segment where the signal is recorded once with STILL REC.

Step 4.
Press the EDIT/REC button and compare the level difference with the level of step 3.

TP1/TD-07



Step 5.
While repeating the EDIT/REC, adjust ◐RV10 (LEVEL) and ◐RV12 (RAMP) for no level difference and the same ramp as against the waveform which is memorized in step 3.

Step 6.
Repeat steps 3 and 4 for several times and check the average of the level difference is 0±0.1V or less.

PROCEDURE B: Using Ordinary Oscilloscope

Step 1.
Record a few minutes and cue it up.

Step 2.
Preset the Δt REC STILL.
Press tne FWD STEP button or the SEARCH TO CUE button, and check the message "RDY STIL" is displayed on the block 5 of the control panel.

Step 3.
Press the FWD STEP button, and memorize at the beginning and at the end of the waveforms.
Note: Do not use the segment where the signal is recorded once with STILL REC.

Step 4.
Press the EDIT/REC button and compare the level difference with the level of step 3.

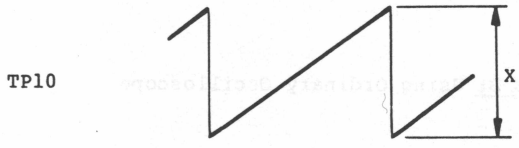
Step 5.
While repeating the EDIT/REC , equalize the level after the EDIT/REC with the level which is memorized in step 3 by ◐RV10 (LEVEL) and ◐RV12 (RAMP).

Step 6.
Repeat steps 3 and 4 for several times and check the average of the level difference is 0±0.1V or less.

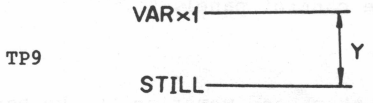
15-30. Δφ DELAY COMPENSATOR ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FIELD
DT-04 Board: S4 =OFF
TD-07 Board: S1-3=OFF
S1-5=ON
S1-6=OFF
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Record a few minute and cue it up.
Preset Δt REC SLOW and memorize the level X with VAR 1/30 times speed.



Step 2.
While switching the mode of VTR STILL/VAR 1x speed, adjust the level Y against the level X memorized in step 1 as follows.



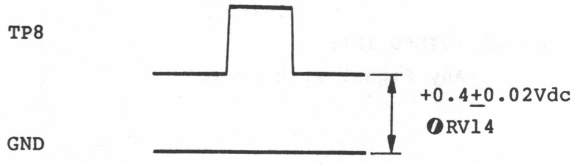
Y = X±0.1V
◐RV15

Step 3.
Be sure to adjust in the STILL mode.
While preseting and/or releasing the Δt REC SLOW, adjust the voltage difference at TP3 for 0±20mV by ◐RV16

15-31. SLIP RING NOISE CANCELLER ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STANDBY ON
Setting ot Switches & Controls;
R/P MODE Sel:FIELD
DT-04 Board: S4 =OFF
TD-07 Board: S1-3=OFF
S1-5=ON
S1-6=OFF
S1-7=OFF
Input Signal (VIDEO IN);
Any Signal with Burst

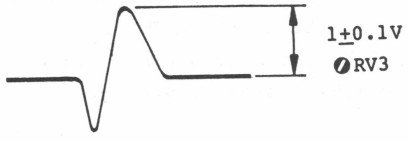
Adjustment TD-07 Board



15-32. LINEARITY COMPENSATOR ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; STANDBY ON
Setting of Switches & Controls;
TD-07 Board:S1-3=ON
S1-4=ON
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment TD-07 Board



After the adjustment, reset S1-3 to off.

15-33. Δt REC LEVEL ADJUSTMENT

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; Normal REC → STILL → Δt REC STILL
Setting of Switches & Controls;
TAPE/EE Sel: TAPE/EE
PICTURE MONITOR Sel: DEMOD OUT
WAVEFORM MONITOR Sel:SELECT VIDEO
TD-07 Board:S1-1=ON
S1-2=ON
S1-3=OFF
S1-4=ON
S1-5=ON
S1-6=OFF
S1-7=ON
S1-8=OFF
Input Signal (VIDEO IN);
RAMP LINEARITY

Step 1.
Record a few seconds and play it back in STILL, then measure the WFM MONITOR OUTPUT level X.

Step 2.
Preset the Δt REC STILL. Press the FWD STEP or the SEARCH TO CUE button and confirm the message "RDY STIL" is displayed on the BLOCK 5 on the control panel.

Step 3.
Press the EDIT/REC button to execute Δt STILL REC and adjust the WFM MONITOR OUTPUT level Y against the level X measured in step 1 as follows.

Y = X±5mV
RV60/MD-22

15-34. CONFIRMATION AFTER ADJUSTMENT

15-34-1. Confirmation of STEP Recording

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FRAME
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Make a normal recording and cue it up.
Set S9-8 on the SY-80 board to on.
Preset the Δt REC STEP and depress the EDIT/REC button (STEP REC is automatically repeated for 255 times) after the message "RDY STEP" is displayed.

Step 2.
Play back the segment where recorded in STEP REC mode with normal R/P mode and confirm the waveform at TP1 on the TD-07 board is much the same as the normal recording waveform recorded in step 1.
If not, perform the check of sections 15-28, 15-29 and 15-30. After the confirmation, reset S9-8 on the SY-80 board to off.

15-34-2. Confirmation of SLOW Recording

Connection; See section 8-4, connection 1.
Equipment; Oscilloscope
Mode of VTR; See respective steps.
Setting of Switches & Controls;
R/P MODE Sel:FRAME
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
Make a normal recording and cue it up.
Preset the Δt REC SLOW and set the tape speed to 4/30 by the SEARCH DIAL. Press the EDIT/REC button and make a slow recording.

Step 2.
Play back the segment where recorded in SLOW REC mode with normal R/P mode. Confirm the waveform at TP1/TD-07 is much the same as the normal recording waveform recorded in step 1.
If not, perform the check and/or the adjustment of sections 15-28, 15-29 and 15-30, and when the adjustment is performed, confirm from the step 1 of section 15-34-1.

Step 3.
Make sure there is no picture dropout or picture shift toward horizontally or vertically.
- If picture will be dropped out, perform sections 15-20 and 15-21.
- If picture will be shifted horizontally, confirm the CF detector on the DV-01 board.
- If picture will be shifted vertically, perform sections 15-9 and 15-25.

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